4th Year - Issue 2008/15

UVS NEWS FLASH

August 25, 2008

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International Seminar & Demonstrations
Organised by: INTRA (CEA - EDF - AREVA)
Fontevraud l'Abbaye, France - Sept 23 & 24, 2008
www.groupe-intra.com

UVS CANADA 2008
National Conference & Exhibition
Ottawa, Ontario, Canada
November 4-7, 2008
www.uvscanada.org

UAS CHINA 2008
1st National UAS Conference
Beijing, China
September 25 & 26, 2008
www.aviationnow.com.cn (Chinese)
& www.uvs-info.com (English)

This event will take place in new Grand Skylight Catic Hotel and is being organized by International Aviation Group of China, in partnership with UVS International.
- **Special session on UAS regulatory issues organised by UVS International.**
- **Conference programme now available on-line.**

EUROCONTROL
Innovative Research ATM Workshop & Exhibition
Eurocontrol Experimental Centre
Brétigny-sur-Orge, France - December 2-4, 2008
http://inoworkshop.eurocontrol.fr

UAS TAAC 2008
Technical Conference & Exhibition
Santa Ana Pueblo, NM, USA - December 9-10, 2008
Classified Session (US only) on December 11, 2008
http://psl.nmsu.edu/uav/conference/2008/

UVS-TECH 2009
3rd International UAS Conference
Moscow, Russia
January 27-29, 2009
www.uvs-info.com
www.uvs-tech.ru

This event is being organized by Expo-Ecos on behalf of the Ministry of Transport & Trade, in partnership with UVS International.
- **Proposals for presentations, along with a 250 word abstract (MS-Word file), should be emailed to UVS International before** 30 September 2008.
- **Special sessions on regulatory issues & non-military applications organised by UVS International.**

ICAUV 2009
1st International Conference & Exhibition on Autonomous Unmanned Systems
Eagleton Golf Resort
Bangalore, India
April 3 & 4, 2009
www.icauv2009.org
www.uvs-info.com

The first ever Indian conference dedicated to UAS, ICAUV 2008 will take place at the Eagleton Golf Resort, located just outside Bangalore. This event is being organized by the Indian Ministry of Defence, DRDO, Aeronautical Defence Est. (ADE), in partnership with UVS International & celebrates ADE's 50th anniversary.
- **Proposals for presentations, along with a 250 word abstract (MS-Word file), should be emailed to UVS International before** 15 October 2008.

UAS 2009
11th International Conference & Exhibition
Paris, France
June 9-11, 2009
www.uas2009.org
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Europe's largest UAS conference. The world's principal conference dealing with UAS regulatory issues. Organised by UVS International.
- **Proposals for presentations, along with a 250 word abstract (MS-Word file), should be emailed to UVS International before** 15 January 2009.

HAWK'S NEST

Insatiable appetite for ever-better intelligence spurs construction

By David A. Fulghum

Aviation Week & Space Technology, USA

www.aviationweek.com/awst

July 28, 2008

Tucked behind a low ridge the first permanent Pacific-theater home for the Global Hawk is reshaping the flightline here. The facility, with its soaring arches, will be large enough to hold up to six of the high-altitude, long-endurance, unmanned reconnaissance aircraft. The hangar, unlike the usual slab-sided aircraft maintenance facilities that sometimes suffer in Pacific storms, is being built around a series of wide, concrete arches designed to withstand typhoon-strength winds. Pieces of a destroyed B-52 in the nearby jungle provide evidence of the weather's seasonal fury. On a regular basis, the hangar will hold up to four of the intelligence, surveillance and reconnaissance (ISR) aircraft with their long, high-aspect-ratio wings. Global Hawk will be stationed here to meet the increasing demand for detailed intelligence.

«Precision weapons are an efficient way to fight,» says Brig. Gen. (sel.) Martin Neubauer, director of intelligence at Pacific Air Forces headquarters in Hawaii. «Let's say I have a weapon that can count the floors as it punches through the target so that it knows where to detonate. That creates a huge requirement for precision intelligence. I want to know how many people are in the building at a certain time of day. I want [to know] the type of concrete and rebar used for the floors. That's what creates the demand for more ISR.» Moreover, how the Global Hawks are used is certain to shift with the number of aircraft in theater. «We're trying to think through Global Hawk use,» says Neubauer. «If you have three, it's a piece of cake. You put them at Guam for ease of maintenance, and fuel and operate out of there.»

But intelligence officials would like to see a bigger ISR fleet that could begin operating regularly - using compatible, perhaps similar, equipment - with foreign military and governmental organizations that want access to surveillance data to meet both defense and natural disaster needs.

«Some may choose to contribute to this with overflight rights, in exchange for data-sharing,» says Gen. Howie Chandler, commander of the Pacific Air Forces. Whatever system is adopted, «we can't afford for Pacaf to operate in a vacuum. How we organize it will require some way for us to incorporate our partners.» Planners and intelligence officials have talked to 11 countries about how they would use Global Hawk. They confronted Pacaf with problems U.S. planners hadn't thought of. Many countries operate with tiny computer capabilities. In the case of tsunami, large fires or other natural disasters, they couldn't even download, much less analyze, all the data that's available. The solution is a change in format that allows small chips of information (that can be processed more easily) to be passed instead of full frame data.

«Global Hawk comes with the processing capability of its Distributed Common Ground Station [DCGS],» Chandler says. USAF planners would like to make those ground stations global in reach. For example, the DCGS in Hawaii processes data for Central Command. «That means no DCGS needs to be idle, since the services can move great cascades of electrons to help each other,» he says. «That's where centralization pays off, and Air Force officials would like international partners and allies to look at the whole unmanned aerial system constellation to see where they might be able to fit in.»

Almost any government could have political problems resulting from granting permission for physical overflight of their country. Those operational, political and technical questions have to be worked out, but the benefits, if not always the investment, could be considerable. «If you need to extend your range farther north, south or a lot farther west, it's impractical to take that aircraft out there for a 4-hr., on-orbit time using a Guam-centric range ring,» Neubauer says. «That leads you to consider at least two alternative bases: One significantly farther south and west and the second significantly farther north.»

While officials won't discuss basing options, Singapore, Malaysia and the Philippines are all considered possibilities, as are South Korea and northern Japan. While bases like Misawa are well away from the packed airspace around Tokyo, national approval of UAV flights is still far from being assured. On the other hand, «Korea is a big deal for high-altitude [surveillance],» Neubauer says. «The indications-of-warning problem is everything there. In Korea you have to know what's going on [because of the short ranges involved]. There is no substitute for a high-alti-tude platform with [Global Hawk-type] sensors since you can't overfly [North Korea].» With the ability to collect massive amounts of intelligence comes the daunting challenge of shaping it into a product that makes sense. «You collect so much that you can't think through it all and, as a result, you no longer understand what you're seeing,» Neubauer says. «I love the ability to put a sensor up for 33 hr. But when you do this, you create a requirement for people to look at and make sense of the data as you go.»

SENSE OF SHAPE

NASA takes step toward active wing-shape control with flights of new fiber-optic sensor

By Graham Warwick

Aviation Week & Space Technology, USA

www.aviationweek.com/awst

July 28, 2008

ASA has demonstrated the ability to sense a wing's shape in flight and determine the stresses on its structure in real time, offering the possibility of improving aircraft efficiency and safety by actively controlling wing shape and redistributing

loads.
The agency is wrapping up flight tests of the Fiber-Optic Wing Shape Sensor on its Ikhana unmanned aircraft, a modified General Atomics Predator B operated by NASA's Dryden Flight Research Center at Edwards AFB, Calif.
Six optical fibers attached to the upper surface of the Ikhana's wing provide more than 2,000 strain gauge measurements in real time. On each side, three 20-ft.-long fibers run from the wing root, aft of the leading edge, around the tip and back to the root, forward of the trailing edge.This allows the system to sense both bending and twisting of the wing, says Lance Richards, advanced structures and measurement group lead.
Weighing less than 2 lb., the hair-thin fibers are glued to the surface of the UAV's wing and covered with sealant, but they could be embedded within the composite structure on future aircraft. They would remain in the aircraft for its lifetime, gathering structural data.
To sense strain - deformation of the wing surface as it bends and twists under load - the system uses «fiber Bragg gratings.» These are local changes in the refractive index of the optical fiber that reflect particular wavelengths of light. These gratings are located every centimeter along the fiber.
Using a tunable laser and special demodulation and processing schemes, the system is able to measure the strain at each of these gratings in real time. This allows deformations to be mapped across the wing and not just measured at discrete points using conventional strain gauges, says Richards. The data can then be used to calculate stress, bending displacement and torsion in real time, he says.
The Ikhana is also instrumented with calibrated strain gauges at 16 different locations on the wing to provide comparative data. Richards believes the NASA tests are the first time a real-time fiber-optic strain sensing system has been validated in flight. «We are pleased with how it has worked. There have been no issues,» he says.
Seven dedicated test flights have been completed, and the system remains installed, gathering data, as NASA uses the Ikhana to image wildfires burning in California. While the test flights were around 2 hr., the fire missions last up to 8 hr., and Richards expects to have gathered some 30 hr. of sensor data by the time they are complete.
Richards says real-time knowledge of aircraft wing shape would be valuable. «The best application is probably long span, high flexure, high aspect-ratio wings with [tip] displacements measured in tens of feet,» he says. «It would have avoided the Helios mishap,» he adds, referring to disintegration of NASA's solar-powered flying-wing UAV when turbulence caused catastrophic pitch oscillations. «The operator had no idea where the wings were.»
As a next step, NASA wants to demonstrate it can use the sensor in a system to adaptively control wing shape. «If we know the shape in real time we can feed that back into the control system to redistribute the loads,» Richards says. That would allow weight to be removed from the structure by reducing the design margins now applied to ensure safety. «People are starting to call this capability `fly-by-feel',» he says, as the spatial resolution provided by the fiber-optic sensor mimics biological systems.
Dryden is seeking funds to flight test active wing-shape control. This would use a next-generation version of the Aerostructures Test Wing flown under NASA's Boeing F-15B research testbed in 2001, Richards says. A combination of the fiber-optic sensors and advanced actuators would sense and change wing shape in flight to redistribute loads.

NO HIDING PLACE

Northrop Grumman tests radar that can track terrorists planting roadside bombs

By Graham Warwick
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
July 28, 2008

An airborne radar that can track individuals as they leave their vehicles to plant roadside bombs is being flight-tested by Northrop Grumman. Built in 18 months under the U.S. Defense Advanced Research Projects Agency's Vehicle and Dismount Ex-ploitation Radar (Vader) program, the system includes an active, electronically scanned array (AESA) radar housed in a Hellfire missile-sized under-wing pod, an electronics unit in the aircraft and the tactical control data link (TCDL). Designed for use on the U.S. Army's General Atomics Sky Warrior unmanned air vehicle, Vader is being flown on Northrop Grumman's Britten-Norman Islander, as a UAV is not available because of surveillance demands in Iraq. «The Islander is a nice surrogate,» says program manager Brian Reise.
Funding for the program is coming from the Pentagon's Joint Improvised Explosive Device Defeat Organization (Jieddo). Awarded in 2006, the contract called for the system to be designed, built and tested within two years, with the intent of early deployment. Northrop Grumman will continue testing through the end of this year, at which point it will be ready for evaluation in operational conditions, he says.
There are two parts to Vader: The air-borne synthetic aperture radar/ground moving-target indication (SAR/GMTI) sensor providing detection of vehicles and individuals - called dismounts - in real time, and a ground exploitation system that uses the radar data for long-duration tracking, change detection and motion analysis. Combined, these provide the ability to detect the emplacement of IEDs.
«The initial concept of operations is to track vehicles and look for vehicles that stop, then track individuals leaving those vehicles to see where they go,» says Reise. Operators
want to continue tracking the vehicle when it moves again, but also look where the vehicle stopped to see if they can detect changes that indicate the planting of a bomb. «It's a unique capability,» he says.

Vader is believed to be the first air-borne radar with dismount detection, Reise says. In flight tests since April the radar has demonstrated its ability to detect dismounts as well as collect SAR imagery at various ranges and resolution. Efforts are now focusing on improving accuracy and reliability and demonstrating the capability of the ground exploitation system, he says.
The challenge in building Vader, according to Reise, is maintaining very low noise in the antenna and processor, so that ground targets moving at walking pace can be detected. The low-weight, tight-tolerance AESA is purpose-designed, although it uses available transmit/receive modules, while the electronics, unit is repackaged from other programs. Another challenge was writing the software to exploit the antenna in 18 months, he says.
Because of its active array, Vader looks different than other UAV radars, says Reise, including the Lynx SAR already carried by the Sky Warrior. General Atomics Aeronautical Systems has delivered developmental Lynx II SAR/GMTI radars to the U.S. Army and recently completed performance tests on the production radar, which will be installed on Beechcraft King Airs operated by the Iraqi air force Lynx II provides wide-area surveillance, high-resolution SAR imagery and broad-area GMTI of vehicles, but does not detect dismounts.
Vader is still expected to be deployed for testing in an operational environment. «The intent was to deploy and it is still actively being discussed with Jieddo,» says Reise. Meanwhile, Northrop Grumman is pursuing other potential applications, including border surveillance. There is Homeland Security Dept. interest, he says, as equipping Customs and Border Patrol UAVs with Vader could help reduce the number of agents required to patrol U.S. border areas.

SKUNKS CLOSE ON BLACKSWIFT
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
July 28, 2008

Boeing and Alliant Techsystems have joined the Lockheed Martin Skunk Works team bidding to build Darpa's Blackswift hypersonic technology demonstrator. Under Darpa's Falcon program, the Skunk Works has completed conceptual design of an unmanned, reusable, turbojet/scramjet-powered vehicle, the HTV 3X, which forms the basis for the Blackswift. The demonstrator is planned to fly in 2012, taking off and landing under turbojet power and accelerating to beyond Mach 6 on ramjet/scramjet power.

HAWKING TO SPAIN
Talks regarding Global Hawk lie ahead, but BAMS protest is still a worry
By Amy Butler and Robert Wall
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
July 28, 2008

After more than a year of posturing, the U.S. State Dept. has given the nod for Northrop Grumman to market its Global Hawk unmanned aerial vehicle to Spain. The country hopes to employ the high-flying, long-endurance UAV on maritime and overland surveillance missions. Deliveries would take about two years after a contract is signed. The deal was initially rejected by the U.S. because of the Missile Technology Control Regime restrictions. As was done for foreign sales of Tomahawk missiles, however, those limits were waived. An eventual sale is expected to include up to five air vehicles and ground support equipment. Indra Defense and Security, a Spanish electronics company, could receive some work from the program.
Spain is likely to house the aircraft at its Saragossa Air Base. Block 30 is the likely choice for the country with a yet-to-be-determined signals intelligence collector. For efficiencies in logistics and training, Saragossa could become a combined site for NATO, U.S. and Spanish Global Hawks. However, NAS Sigonella, Italy, has also been in the running as a potential host for the U.S. Global Hawks likely to be based in Europe. If a sale goes through with Spain, the additional buys - on top of U.S. and NATO orders - could help lower the price of the system and stabilize parts supply and vanishing vendor issues.
Meanwhile, Northrop Grumman has Global Hawk Block 20s, 30s and 40s in various stages of production. Block 20 includes the larger wing to achieve 3,000 lb. of payload (a requirement designed to allow the aircraft to more closely mimic the capabilities of the U-2 it will replace). It also includes the Raytheon Enhanced Integrated Sensor Suite (EISS). Block 30 includes the new Airborne Signals Intelligence Payload (ASIP). Block 40 will carry a canoe on its underside for the 4 X 1.5-ft. Multi-Platform Radar Technology Insertion Program (MP-RTIP) ground surveillance sensor.
The U.S. Air Force expects to purchase 12 MP-RTIP sensors for Global Hawk, and the sensor is the basis of NATO's Alliance Ground Surveillance system. Despite new delays in flight testing of various modes for the sensor, integration onto the first Block 40 is expected next spring with flight trials to follow in the summer.
An operational assessment of the EISS was recently completed with a report expected soon. Initial Operational Test and Evaluation for the Block 20 and 30 aircraft is expected to begin in summer 2009 with completion in late fall.
Meanwhile, the Government Account-ability Office is still sifting through a Lockheed Martin/General Atomics protest of a Navy contract award to Northrop Grumman. A Global Hawk model was chosen over a Predator variant and a Boeing offering for the Navy's Broad Area Maritime Surveillance (BAMS) program. The audit is expected to be complete by mid-August. If irregularities in the procurement process are found, the program could go into a similar tailspin as the Air

Force's Combat Search and Rescue-X and KC-45A tanker programs.
One question facing the Global Hawk in the meantime is when will the Air Force certify to Congress that it is suitable to assume the U-2 high-altitude surveillance and reconnaissance mission. Once declared, the service will begin retirement of the manned system and begin transferring more missions to Global Hawk. This point has been a matter of contention for the U-2 community, which has consistently argued its mission cannot be fully handled by the Global Hawk. The unmanned system's sensors aren't as capable as those of the U-2.
Meanwhile, Northrop Grumman's Unmanned Combat Air System Demonstrator (UCAS-D) is proceeding on schedule. Skins for the first of two demonstrators are being installed onto the airframe. Manufacture of the second is also underway. The aircraft will be used by the U.S. Navy to demonstrate the ability of
a tailless UAV to operate with aircraft carriers. Flight of the first UCAS-D is expected in November 2009.
UCAS is expected to demonstrate basic capabilities in advance of a U.S. Navy purchase of air vehicles. The service hopes to begin operating UCASs from carrier decks by 2025. It is a candidate for the Navy's F/A-XX fighter replacement program.
In light of financial demands of the Iraq and Afghanistan wars, however, the Navy is exploring options to reduce funding for the UCAS program, possibly slipping some of its goals. The issue will be taken up this fall as the Pentagon prepares its Fiscal 2010 budget for Congress in February.
Meanwhile, General Atomics Aeronautical Systems is continuing testing of its Block 1 U.S. Army Sky Warrior UAV system. Two of eight Block 0 aircraft, configured with the larger Predator-based airframe with the service's heavy-fuel engine, remain in U.S. Central Command supporting war efforts.
The Block 1 will include a new ground control system, data links and an automated landing capability suited for the Army, which does not use rated pilots for UAV operations. The system will also use a new Raytheon-made DAS-2 electro-optical and infrared ball as well as the Lynx II synthetic aperture radar. With capacity for four Hellfire missiles, it doubles the armament of the USAF's Predator.
Army-conducted Limited User Tests are set for early next year; its maiden flight took place earlier this year.
It's anticipated that by October U.S. Army and Air Force officials will draw up a plan to proceed with a single platform for both services. This will help to avoid the complications of operating and maintaining the MQ-1B Predator, MQ-9 Reaper and MQ-1C Sky Warrior.
The Air Force flew its first operational MQ-9 Reaper mission over Iraq last week; MQ-9s are being eyed as a replacement if F-16s are rotated out of the theater. Meanwhile, AAI plans next year to select a contractor to outfit its tactical Shadow 200 UAV, used by the U.S. Army and Marine Corps, with a laser designator. This will provide ground forces in Iraq with more capability to mark targets for attack with laser-guided weapons.

Interview: LtGen. Freek Meulman
Vice Chief of Defense, Netherlands Armed Forces
Defense News, USA
www.defensenews.com
July 28, 2008

The Netherlands military's strongest presence today is in Afghanistan, but it also plays a part in NATO operations in the Balkans, in the EUFOR/Chad mission supporting humanitarian and police action for the United Nations mission in Chad with a reconnaissance unit, and, until recently, in the World Food Program, escorting aid ships off the coast of Somalia.
The Dutch military focuses on a «3-D Approach,» combining defense, diplomacy and development, said Lt. Gen. Freek Meulman, vice chief of defense of the Netherlands Armed Forces. «That comprehensive approach is fundamental for success,» Meulman said. «It's the basis on how we plan and how we task and how we execute the mission.»
Meulman is former deputy air commander for the NATO-led International Security Assistance Force in Afghanistan, where Dutch forces participate in peacekeeping and humanitarian operations.

Q. A recent report by the Center for Strategic and International Studies concluded that European armed forces will become smaller but better equipped. Is this where the Netherlands Is headed?

A. Ever since the [Berlin] Wall came down, we changed the focus of the defense organization, whereby in the past, of course, the focus was to the East. And since 1990, we understood rather quickly that the world would never be the same as before and that we might find ourselves in places remote from where we used to operate. So we started the process of reorganizing, making it more agile, deployable, working our way towards what we called humanitarian operations. We downsized heavily on heavy armor. We invested in strategic transport, both on the Navy side and on the Air Force side. We procured more helicopters, which I think play an enormously important role for all kinds of reasons, including resupply. So we actually focused on the broad range of operations, ranging from the low-level situations to high-spectrum. And actually, what we wanted was a range of capabilities that we could deploy and use in particular situations.

Q. Will you send more troops to Afghanistan?

A. We had a political discussion in Holland on extending the mission. The decision was taken to extend the mission from the first of August this year for another two years.
At the same time, participating in an operation so far from home with so many people, and because we rotate them on a frequent basis, it's a good burden for the organization to maintain such a scheme. So what we try to

do is ease that pressure a little bit by inviting other partners to contribute to the mission. We intend to downsize a little bit, a couple of hundred, and at the same time, increase the international participation. And, for example, Hungary, Czech Republic, Slovakia, France, Singapore and Georgia are contributing capabilities - that is, manpower, assets that substitute for the decrease in Dutch participation. I think we will remain somewhere [with] the national participation around 1,500.

Q. What are the lessons learned from the Netherlands' involvement in Afghanistan?

A. The first important thing is that we took the right decisions in the '90s in order to build an organization, build a force structure that is capable of participating in a mission like Afghanistan, like Iraq.

Lessons that you can derive from Afghanistan is, first, you need to have the capability to get there. And that is you need the most what I call independent air transport capability. And again, that lesson of the '90s to procure the (K)DC-10s, the tankers, the enablers to do this. So we had them available. It's a very important lesson for Afghanistan because that country is so remote, with limited infrastructure. So what you need to have in an area without a decent infrastructure, where you can use ground transport - although there is a whole lot of ground traffic - but still, you need aerial resupply.

Another lesson is that information is key. UAVs, intelligence, surveillance and reconnaissance are fundamental in order to prepare the battlefield, in order to get the right information.But a very, very important one is that the military can't do it just by themselves. What you need to have is an opportunity to bring together all key players in the realm of security. Also reconstruction and development, also governance building, etc., etc.

Q. What are some of your future acquisition goals?

A. I am quite sure we will revisit the need for UAVs, that we will even look more into capabilities for strategic transport. I'm very happy to announce that we signed the memorandum of understanding for the C-17, which provides us the necessary wide-body strategic capability for all the support in that area

But another thing is the count-er-IED. The IED threat in an area like Afghanistan is so big and impacts so much on the safety and security of your people that you need to have the right capabilities to almost circumvent that threat and be capable of facing the threat and working the threat. So you need to have stand-off capabilities, search capabilities, but also protection for the soldiers, such as Bushmasters, armored vehicles, such as personal protection.

Q. If defense budgets decrease In Europe, how are procurement goals prioritized?

A. The point in Holland is that we are not decreasing; we are luckily getting more money. And the good thing is that although we see maybe some reorganization, the political side understands what the implications of such a deployment are - and that is the wear and tear - and that additional funding is made available to replace assets and to do the things we have to do. Also to make sure that we can sustain training, that we can sustain personal equipment. That you can give the best you have for the best people you have in your Air Force and Army and Navy. Because that's what it's all about. It's all about the most strategic asset of your force, and that is personnel.

Q. Has the Netherlands set the number of Joint Strike Fighters to buy?

A. For planning purposes, we have put forward the figure of 85, and that is what we have calculated as the required capability to do what we have to do. At the same time, we took the decision that if the political decision is taken to procure the JSF, which is not taken yet, we will go for a so-called batch approach.. We are a level 2 partner in JSF. We participate in the production, sustainment and follow-on development stage. We just took the political decision to sign the MoU for the operational test and evaluation. That's very important because by being a participant in the test and evaluation, we can validate the requirements that we all set forward a couple of years ago. The first contract for the first test aircraft is being signed in 2009. The formal decision on the procurement of the replacement of the F-16 is going to happen in 2010. And if that is the JSF at the time, then we proceed.

Q. Are you concerned about cost estimates for the JSF?

A. There is a lot of talk about cost. We have confidence. We have a very tight mechanism to follow these developments. We have our own national accounting office that is very much involved. We are close partners in the JSF project. And we will monitor what's going on and see what's happening. But I can tell you, within the realm of what we know, is that JSF is the best aircraft at the best price.

Q. Is it a challenge for the Netherlands to contribute forces to both NATO and the European Union?

A. First of all, we are very positive when it comes to the development of both sides. We are strong supporters of NATO. We are strong supporters of the EU. The EU has some ambition to be more visible on the military side as well. Having said that, it's our Dutch position that whatever we do, it's always balanced in a way that there's just one toolbox. So we will not duplicate. We are not supporters of duplication in capabilities. We are strong supporters of making sure that we use what we have. And we will decide on a case-by-case basis if that is in support of one mission or another.

Q. Does the size of U.S. defense spending create problems for cooperation with European allies?

A. The U.S. is a big player in terms of investing, in terms of political will, in terms of the role it wants to play. Holland and America are incomparable in terms of these things, in terms of defense budget. But, what is important for us is that we define and have defined what our ambition level is. That we make sure that we build that organization and, secondly, that we seek partners where we think we can find a close cooperation. And the United States is a great partner in this respect. The United States plays such a very important role when it comes to education and training, when it comes to procurement. If you look at the Dutch toolkit and look at other assets, you will see that there is a direct cooperation on that side. We work together, operate together. We directly liaise and coordinate and cooperate with each other.

PRESS RELEASE

NGC to Develop Persistent Surveillance Payload for UAVs
Northrop Grumman Corporation, Linthicum, Md., USA
July 28, 2008

Northrop Grumman Corporation has been awarded a contract by the U.S. Office of Naval Research to develop and demonstrate a signals intelligence (SIGINT) payload for use on an unmanned aerial vehicle (UAV) under the Warfighter's Tactical SIGINT Resource (WTSR) program. «In today's battlespace environment, persistent surveillance is key,» said Fred Bean, WTSR program manager. «Tactical units must rapidly and reliably use sensor networks to track potential targets; collect, send and receive actionable intelligence; and automatically receive warning of impending dangers. The WTSR program is aimed at providing expeditionary forces with that kind of enhanced battlespace awareness. We look forward to providing our expeditionary fighting forces with the right data and the right amount data at the right time. «Tactical units at the lowest echelon currently receive little to no intelligence of value because they have very few - if any - ISR assets under their direct control. The WTSR program will help to overcome that problem as well as a number of other key limitations associated with conventional sensor technology,» he said.

A MORNING STAR SHINES
China has reversed the fortunes of its defence industry in the past 10 years by accepting the market as a generator of wealth and vision, says Timothy Hu
Jane's Defence Weekly, UK
www.defensenews.com
July 30, 2008

With bustling production lines and surging profits, China's defence industry is booming. Its weapon manufacturers are feasting on a backlog of orders from the country's armed forces and capitalising on leadership exhortations to catch up with the world's advanced military industrial powers within the next two decades by investing heavily in research and development (R&D).
These successes represent a remarkable turnaround for an industry that was on its knees only a decade ago and haemorrhaging red ink. In the intervening years, the defence industry has undergone a far-reaching restructuring and downsizing to shake off its old identity as a bloated bastion of socialist central planning and become a more market-driven and innovative sector. This has led to the shutting of several hundred factories and the loss of hundreds of thousands of jobs.
The success of this reform drive can be measured in the improving financial performance of the entire defence sector. Officially disclosed earnings in 2007 for the 11 conglomerates that sit at the top of the Chinese defence industrial pyramid totalled USD6.3 billion - a record high and an 80 per cent jump on 2006 earnings - while total revenues for 2007 posted a strong 17.6 per cent gain on the previous 12 months. However, as more than three quarters of this income is derived from non-defence-related activities, such as the sale of civilian goods, this rosy financial picture reflects a highly diversified business portfolio that includes a robust growth in military orders.
Another indicator of the defence sector's health and vibrancy is the steady stream of new and more capable weapons that are being produced or are under advanced development. In the past two years, China has unveiled an array of new indigenous weapon platforms that are at least a generation ahead of its existing arms line-up. This includes the Chengdu J-10 combat aircraft, the WS- 10 jet fighter turbofan engine, Luyang- and Luzhou-class destroyers, Song-class submarines and a ballistic anti-satellite weapon system that destroyed a satellite at an altitude of 865 km in a test in early 2007.

State Planning

To meet the near-term rearmament needs of the People's Liberation Army (PLA) and at the same time satisfy the longer-term transformational aspirations of the political leadership, the defence industry is pursuing a twin-pronged approach whose priorities, goals and aspirations are set out in two different sets of planning guidance.
The immediate and short-term requirements are addressed in the 11th Five Year Defence Science and Technology (S&T) Plan that runs from 2006 to 2010 and calls for «giving impetus to the combined development of mechanisation and informatisation». This plan is practical and pragmatic in nature and is grounded in the realities of limited defence budgets, restricted access to state-of-the-art foreign technology and know-how and the overall backward state of the PLA's current technological standards.
A central goal of the 11th Five Year Plan, according to the 2006 Chinese Defence White Paper, is to «lay a solid foundation by 2010» for the country's military posture. The defence industry will be expected to assist the PLA in selectively replacing a limited proportion of its existing arsenal with new-generation naval, aviation and missile hardware.
The remaining bulk of the inventory would be upgraded cheaply through the addition of sensors, navigational positioning systems, infrared detectors, computers and other devices that would allow them, in theory at least, to conduct network-enabled operations. Another important priority for the defence industry during this period is to press ahead with structural

reforms intended to improve the flow of funds, technology and knowledge into and across its system.
A far bolder vision is contained in the long-range planning guidance. The 'Development Programme of S&T for National Defence 2006 to 2020' and its civilian counterpart, the 'Guide-lines for the Medium- and Long-Term National S&T Development Program 2006 to 2020', were promulgated in 2006 and, taken together, represent a comprehensive blueprint for the undertaking of ambitious technological leap-frogging efforts to 2020.
Key research and development priorities include command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR)-related capabilities, such as information technology, laser technology, space-based technology and high-speed computer technology, as well as electronic warfare systems and integrated command automation networks.
While the specific contents of the 15-year defence S&T plan are classified, a brief published outline shows that the focus is on basic and frontier defence technologies, early and advanced-stage applied R&D of next-generation weapons and the development of dual-use high-technology industries and manufacturing technologies for the defence sector. This is likely to include conventional weapon projects such as the next-generation J-X combat aircraft, which is reportedly a stealthy, twin-engine jet powered by the WS-10 and has been undergoing R&D for the past decade, and a number of airborne warning and control systems, such as the KJ-200 and KJ-2000 aircraft.
The civilian medium- and long-term S&T development plan offers more concrete details of a number of specific dual-use and strategic high-technology projects being pursued by the defence industry that are receiving priority state funding. They include the development of a 'large-sized' passenger airliner, high-resolution earth observation systems, manned spaceflight and moon exploration projects and large-scale nuclear advanced pressurised water reactors and high-temperature and gas-cooled reactors.

Rank and File

The Chinese authorities recognise that sustainable progress in defence technological and hardware modernisation has to go hand in hand with the upgrading of the structure, management and operations of the defence industry, which has seen a number of important reforms implemented in the past year. In March 2008 the Commission for Science, Technology and Industry for National Defence (COSTIND), which had been in charge of the military industrial complex for the past 25 years, was merged into a new super bureaucracy called the Ministry of Industry and Informatization (MII) and renamed as the State Administration for Science, Technology and Industry for National Defence (SASTIND).
Critics of COSTIND contended that this organisation should be abolished because it was a legacy of the defence industry's Soviet inheritance and hindered rather than promoted technological innovation and industrial efficiency owing to its excessive interference in enterprise affairs. Much of this criticism came from military officers who argued that COSTIND's defence-related work should be undertaken instead by the PLA's General Armament Department. They pointed out that oversight of the defence industrial complex in the US and Europe is handled by the Pentagon and defence ministries.
In the March reorganisation SASTIND was demoted from a ministry-level entity to a bureau-level outfit, which in the hierarchy conscious Chinese bureaucracy has important implications for political influence and access to decision makers. In another blow, SASTIND lost control over its management of the nuclear energy sector, which was handed over to a new National Energy Commission.
Other government agencies merged into the MII along with SASTIND include the Ministry of Information Industries, State Council Informatization Office, portions of the National Development and Reform Commission responsible for industrial and trade issues and the State Tobacco Monopoly Administration. The new head of SASTIND, Chen Qiufa, a former COSTIND deputy director, is also a deputy minister within the new ministry. MII Minister Li Yizhong is a petroleum expert with no prior background in defence industrial affairs, which suggests that his interests and priorities are unlikely to be in the military realm.
The stated goals of the MII are to promote the coordinated development between traditional industrial sectors and high technology and the information and communications technology industries, play a leading role in the indigenous nurturing of key strategic industries and support civil-military integration. This would require close coordination between SASTIND and the rest of the MII apparatus.
Government officials say that the new ministry's role is not to intervene directly in the micromanagement of enterprises or the market but to focus on strategic planning and the drawing up of industry standards and regulations. The establishment of MII along with several other super ministries is described as a trial experiment and some analysts believe that it may take several years before these new organisations are integrated and functioning properly.
A key question is whether SASTIND will be able to retain its traditional wide ranging autonomy and political clout or lose its independence and be fully subsumed into the new ministerial structure. With a long experience of bureaucratic infighting and organisational survival, SASTIND stands a good chance of preserving its autonomy within the new government setup.

Power Struggle

However, with its diminished formal access to high level decision-making circles, SASTIND's clout in policy-making and the internal battles over budgets is less clear. This may provide an enhanced role for the Central Special Commission (CSC); a high-powered *ad hoc* committee that is formally affiliated with the State Central Military Commission - the country's top political-military decision-making body. The CSC is headed by the country's Prime Minister, Wen Jiabao, and includes representatives from the military, defence industry and other government agencies. The CSC is involved in

inter-agency coordination and approving major strategic technology projects such as the country's manned space programme.

SASTIND's lower status could allow more room for the country's defence industrial corporations to flex their growing commercial muscle. There are presently 11 state-owned enterprises that dominate the six subsectors of the defence industry. A duopolistic arrangement has been in place since the end of the 1990s when the central government sought to break up monopolies and promote competition by establishing two companies in most of these sectors:

- In the nuclear industry China National Nuclear Corporation is responsible for the country's nuclear arsenal and civilian nuclear power programme while China Nuclear Engineering and Construction Corporation is primarily involved in the construction of nuclear power plants and defence-related nuclear facilities.
- In the shipbuilding sector, China State Ship-building Corporation (CSSC) is the principal equipment supplier to the PLA Navy, which includes missile destroyers, frigates, submarines, missile corvettes and auxiliary vessels for space instrumentation and replenishment. In 2007, production from CSSC accounted for 22 per cent of total Chinese shipbuilding output and the company has set its sights on becoming the world's largest shipbuilder by 2015. China Shipbuilding Industry Corporation is heavily focused on civilian shipbuilding, although it does have a sizeable naval division. It has some of the largest shipbuilding yards in China and can build vessels up to 300,000 DWT (dead-weight tonnage);
- Extensive overlap exists in the space industry between China Aerospace Science and Technology Corporation (CASTC) and China Aerospace Science and Industry Corporation (CASIC). CASTC's core strengths are in launch vehicles, manned spacecraft and satellites, including communications, meteorological, earth resource and scientific experimental satellites, as well as strategic and tactical missiles, while CASIC specialises in the development and production of guided missile systems, especially surface-to-surface, air defence, cruise missiles, mini-satellites and information technology;
- The two dominant ordnance entities are split along geographical and functional lines. China Ordnance Industrial Group Corporation, known as China North Industries Corporation (Norinco), has most of its facilities located in the country's northern provinces and manufactures the bulk of the industry's tanks, armoured vehicles and munitions supplies. China Ordnance Equipment Group Corporation is concentrated in southern China and its core business is in civilian vehicle production, which accounts for more than 50 per cent of its annual revenues;
- The defence electronics sector, by contrast, has only one overarching conglomerate China Electronics Technology Group Corporation, which was established in 2002.

In a significant departure from this demonopolisation strategy the country's two aviation industry groups are being consolidated into a single entity - a move that will be completed by the end of this month. Analysts say that a key reason behind this move was that the 1999 separation of Aviation Industries Corporation of China (AVIC) I and II was poorly conceived and had adversely weakened the Chinese aviation industry's competitiveness because of widespread duplication of activities. Additionally, the two companies were dwarfed and squeezed out of the international market place by far larger Western companies. The annual sales revenues of Boeing, for example, are four times the combined total for AVIC I and AVIC II. The merged company, which will be known as China Aviation Industry Group Corporation, will have around 200 subsidiaries and assets of USD32 billion.

An important catalyst for the aviation industry's reorganisation was the amalgamation of the commercial aviation arms of AVIC I and AVIC II in May into a separate company called China Commercial Aircraft Corporation (CCAC) that will be responsible for the indigenous development of a new large 150-seat airliner/military transport aircraft. This is intended to reduce China's reliance on Western manufacturers such as Boeing and Airbus. China so far only has experience in developing mid-sized passenger and transport aircraft, such as the 90-seat ARJ21 regional airliner.

Technology Showcase

This large passenger airliner project is a leading priority in the Chinese government's medium- and long-term S&T development plan and its political importance was reflected in the appointment of former COSTIND director Zhang Qingwei as CCAC chairman.

This project will be a useful barometer to assess how much risk and new thinking the defence industry is willing to embrace in pursuing ambitious high-technology R&D projects. One pioneering approach that CCAC is preparing to take is to list on the Hong Kong stock market to raise capital to fund its development costs.

Tapping into financial markets is a new initiative by the once-secretive defence industry, which has previously relied almost exclusively on government funding. The defence industrial authorities began taking steps in 2007 to open up the country's stock and capital markets to defence industrial enterprises. A key goal is to expand the sources of funding available for defence firms to tap into and reduce their heavy reliance on the state. Chinese officials say that the limited access to investment funds has been a major factor holding back the defence industry's growth and technological modernisation.

The authorities are especially eager to attract domestic state-owned, private and even foreign firms to acquire equity stakes in defence companies as well as allow them to list on the country's two stock markets in Shenzhen and Shanghai and also in Hong Kong. COSTIND issued a series of policy guidelines and regulations last year to define the framework of this market liberalisation.

According to a senior SASTIND official involved in drafting these reforms, this policy initiative «signifies that the

reform of the defence science and technology industry has entered a new historical phase, which will certainly have a far-reaching impact on the building of a new defence science and technology system». Another SASTIND official said that the defence industry could raise upwards of USD9 billion by the end of this decade.

Companies affiliated with the defence industry have been allowed to list on the stock markets since the early 1990s, but under tight restrictions that precluded entities involved in military-related work. The new, more permissive regulatory regime now allows companies with military programmes to make stock-market or private listings to outside investors as long as they satisfy secrecy regulations and their defence projects are not deemed to be too sensitive.

Within a few weeks of the passage of these new regulations in November 2007, Xian Aircraft International, a defence company listed on the Shenzhen stock exchange, won approval for a private USD970 million share placement with 10 Chinese state-owned firms to acquire civilian and defence assets from its parent Xian Aircraft Industry Corporation (XAC) - one of the country's major aircraft manufacturing outfits. XAC builds the FB-7 naval fighter-bomber and the H-6 bomber.

The willingness to reach out to the non-state sector is another important aspect of the Chinese defence industry's realignment and integration within the broader national economy. As the defence industry has significantly downsized and diversified its business activities during the past couple of decades, its core of dedicated defence enterprises has also been reduced. In response, the defence industrial authorities have sought to broaden its supporting base of secondary subcontractors that are able to supply both military and non-military components and services to the top-tier prime contractors and systems integrators.

In recognition that the private sector has now become a pivotal driver of the country's economic and technological growth, the central government in 2005 for the first time formally allowed non-state firms to bid for work from the defence industry. Informal cooperation had been taking place for some time, although this was limited to select numbers of privileged and well-connected civilian firms such as Huawei Technologies. COSTIND and its successor SASTIND have so far issued several dozen licences that allow private firms to bid for defence industrial contracts. Allowing non-state firms to participate in defence industrial work is a key plank of a broader strategic initiative aimed at forging an integrated civil-military dual-use economy.

Defence industrial authorities are especially keen to forge close ties between the defence industry and non-state firms in the information and high-technology sectors and academic research institutions such as universities and

scientific academies that possess advanced technological skills and capabilities not available in the defence sector.
Defence industrial enterprises hope that by leveraging the commercial technologies and business practices of civilian firms, this can lead to major productivity and efficiency gains as well as improvements in products. The design, development and testing of weapon systems, for example, especially complex equipment such as combat aircraft and warships, is a prolonged process that often takes as long as 15-20 years for the Chinese defence industry to carry out. Consequently, these weapons are prone to being overtaken by technological advances before they even enter into service. Through the use of already developed commercially available technologies and advanced manufacturing processes, this could offer substantial time savings and reduce the risk of lengthy delays.
The development of the Chengdu Aircraft Corporation's (CAC's) FC-1/JF-17 fighter shows the benefits that can be reaped by employing commercially available technology and know-how. CAC was able to shorten the time frame for the research and design of the aircraft by as much as 50 per cent through the use of computer-aided design and manufacturing software.
Substantial cost savings could be gained through the employment of commercial manufacturing processes and the joint sharing of R&D expenses. Chinese estimates suggest that joint development of civil-military projects could lead to investment savings of as much as 40 per cent.
The acceleration in the opening up and reform of the Chinese military industrial complex and a growing outflow of hardware from the domestic weapons R&D pipeline suggests that after more than a decade of leaning heavily on Russia as a key source for advanced military equipment and technology, the PLA may now look increasingly to its own defence industry to meet its needs.
This shift from reliance on Russian arms to favouring indigenous sourcing appears to be a decisive factor behind a significant slowdown in Chinese-Russian arms deals. According to the Stockholm International Peace Research Institute, Russian arms sales to China fell by 62 per cent in 2007 from the previous year. Russian estimates of the total value of Chinese arms acquisitions from Russia since the beginning of the 1990s is around USD27 billion.
The reasons behind this improvement in Chinese indigenous defence industrial capabilities have sown discord in ties between Moscow and Beijing. Russian officials allege that China's success in revamping its defence industrial capabilities has been largely due to its illicit copying and reverse engineering of key Russian weapon systems. This has allowed China to replace its arms imports from Russia with Chinese-made copies. The most prominent of these infringements include the Su-27 fighter and advanced defence electronic systems, such as radar and datalink systems for the Sovremenny II 956E destroyer and Fregat M2EM 3D and Mineral-ME radar systems.

Intellectual Rights

The case of the Su-27 appears to have been the most egregious. China signed a licence agreement in the mid-1990s to produce upwards of 200 Su-27s from Russia at its Shenyang Aircraft Corporation facilities in northern China. Output of the aircraft occurred smoothly until 2004, when negotiations for shifting production to a more advanced version of the Su-27 ran into problems as China indicated that it did not want to build any more of the aircraft.
In 2005 China was discovered to have been engaged in the development of the Shenyang J-1 1B, which is a reverse-engineered Su-27 but with extensive incorporation of indigenously developed technologies. China also received assistance from Ukraine and Belarus, which are major Su-27 users. Improved features of the J-I IB over the Su-27 include a reduced radar cross-section, improved fire-control radar, use of composite materials, a new flight control system and a digital glass cockpit. An extensive effort to incorporate the WS-10 powerplant into the J-I IB is under way, but this has so far not been successful and China has had to instead acquire large numbers of AL-31FN turbofan engines from Russia.
Following public furore in Russia over this apparent Chinese copying, new Russian President Dmitry Medvedev was reported to have sought an agreement on the protection of Russian defence intellectual property rights during his inaugural state visit to China in May. At the same time, however, both sides continued to discuss future arms sales and technical cooperation, including deals for combat aircraft, naval weapons and the possible renovation of Russian weapons purchased during the 1990s.
As the Chinese defence industry seeks to reduce the PLR's dependence on Russian arms, it is also looking to become a major arms exporter again. During the 1980s and early 1990s, China was among the world's leading weapon suppliers to developing countries, but it stumbled after the mid- I990s as the domestic defence industry was unable to produce arms that could compete in the international market place.
With a burgeoning arsenal of capable and cost-effective weapons, Chinese arms manufacturers are actively marketing their products. Among China's main customers are Pakistan as well as countries in the Middle East and Africa.
However, the PLA is likely to remain the Chinese defence industry's dominant client for the foreseeable future and will drive the requirements for the industry's long-term technological development. While the gains in productivity, technological innovation and quality standards during the past 10 years have been impressive, China still lags one or two generations behind the most advanced industrial nations.
Bridging this technological gap represents a much greater challenge for the Chinese defence industry because it will need to go beyond a tried and trusted conservative strategy of making incremental improvements and pursue higher-risk R&D approaches that require extra effort if it wants to master the disruptive technologies that the US and other major military powers have or are working on, such as stealth technology and network-centric systems.

BOEING AGREES TO PURCHASE INSITU

By Damien Kemp
Jane's Defence Weekly, UK
www.defensenews.com
July 30, 2008

Boeing has decided to purchase unmanned aerial systems (UAS) company Insitu, which the US giant has cooperated with during the development of the small ScanEagle UAS since 2002.
The purchase, which was announced on 22 July and is expected to be completed by the end of September, will provide Boeing with a rapidly growing business to be incorporated within its Integrated Defence Systems' Military Aircraft unit.
Insitu is predicted, by Boeing, to have revenues of USD150 million in 2008: 70 per cent up on 2007. The terms of the transaction were not disclosed. The ScanEagle has been purchased by US defence forces and agencies, is supplied to the Australian Defence Force and is under consideration by Pakistan.
Potential for the aircraft in Australasia and for other Insitu activities in the Pacific led the company to announce in May that it was opening a subsidiary in Queensland, Australia.
In August 2007 the US Marine Corps (USMC) awarded Boeing a USD18 million contract to provide ScanEagle intelligence, surveillance and reconnaissance (ISR) services for the Marine Expeditionary Force in Iraq.
In June of the same year Boeing Australia was been awarded a six-month AUD20 million (USD16.8 million) contract to provide ISR services to the Australian Army in Afghanistan using ScanEagle.
The aircraft is continuing to be developed. It has been flown operationally with a heavy engine, it has been trialled with a small synthetic aperture radar (NanoSAR made by ImSAR) and extensive trials have been conducted with launch and recovery of the aircraft from naval vessels.

CHINA REVEALS WORK ON UNMANNED COMBAT PLATFORMS

By Ted Parsons
Jane's Defence Weekly, UK
www.defensenews.com
July 30, 2008

Details of China's ambitions to develop unmanned combat aerial vehicles (UCAVs) and tilt-rotor unmanned aerial vehicles (UAVs) emerged on Chinese Internet pages in late June. This followed a UAV conference earlier in the month at Nanjing University of Aeronautics and Astronautics (NUAA): a well-known centre for UAV development.
At a conference display by Luoyang Optoelectric Technology Development Corporation (LOEC) - a company better known for its air-to-air missiles and 'electro-optic systems - there was an apparent concept model of a turbofan-powered UCAV similar in size to the US MQ-9A Predator 2. The LOEC concept model also appears to be based on the Guizhou WS-2000A UAV. These two UAVs share a similar nose, wing, engine and canted stabiliser configu-ration. However, the LOEC concept differs in having a deeper faceted fuselage, mid-fuselage wing mounting and the addition of four-wing hardpoints for ordnance. The concept appears to be armed with a version of the company's TY.90 air-to-air missile and a heavier air-to-ground missile.
A second NUAA project on show was a model twin electric motor-powered tilt-rotor UAV The model appeared to be intended to test the aerodynamics of a simple tilt-rotor. Such research at NUAA is probably funded by the People's Liberation Army (PLA) and larger and more capable UAVs - even atilt-rotor aircraft similar in size to the Bell Eagle Eye - would be attrac-tive to the PLA Navy and other services.

SEEKER 400 ENTERS FINAL DEVELOPMENT PHASE

By Helmoed-Römer Heitman
Jane's Defence Weekly, UK
www.defensenews.com
July 30, 2008

South Africa's Denel Dynamics is in the final phase of development of its new Seeker 400 unmanned aerial vehicle (UAV) system, which will be unveiled in mock-up form at the African Aerospace and Defence show in Cape Town in September, the company has announced. Developed with an eye towards the needs of the South African National Defence Force, the Seeker 400 is about 30 per cent larger than its predecessor, the Seeker II, and aims to improve on its speed, endurance and payload among other attributes.
The payload of the Seeker 400 has been doubled to 100 kg and its endurance boosted from 12 to 16 hours. The new engine gives 1,000 hours mean time between minor overhauls and 2,000 hours between major overhauls, compared to 75 and 150 hours respectively and has a 100-hour sparkplug life compared to 15 hours for its predecessor. Its 16-hour endurance is achieved at the optimal loiter speed of 65 kt at 5,000 ft, when the engine burns 8 litres of fuel per hour. The Seeker 400 is also already Civil Avia-tion Authority qualified.
In its standard form, the Seeker 400 will be offered with the Argos 41 OZ stabilised sensor turret developed by Denel Optronics (now Carl Zeiss Optronics). This is a four-axis gimbal design that mounts the Carl Zeiss ATTICA

thermal imager and a high-resolution charged-coupled device (CCD) camera with a zoom lens, as well as an optional laser rangefinder and laser designator. It can be fitted with a correlation autotracker.

CURTISS-WRIGHT CONTROLS LANDS $4.25M CONTRACT
Charlotte Business Journal, USA
http://charlotte.bizjournals.com
July 31, 2008

Curtiss-Wright Controls Inc. has been chosen for the development phase of the integrated computer system program of the U.S. Army's future combat systems.Under a $4.25 million contract with General Dynamics C4 Systems and Rockwell Collins Inc., Curtiss-Wright will supply hardware that connects computers in the program. General Dynamics and Rockwell Collins will provide the computer processing, networking and data-storage for the system.
The army's future-combat systems are part of a group of manned and unmanned ground-defense vehicles and unmanned aerial vehicles under development. Curtiss-Wright Controls is a unit of Roseland, N.J.-based Curtiss-Wright Corp. (NYSE:CW). The company designs and makes motion-control, metal-treatment and flow-control products. Curtiss-Wright Controls is based in south Charlotte.

AEROVIRONMENT
Armada International, Switzerland
www.armadainternational.com
August/September 2008

Aerovironment (AV) has received an IDIQ contract, with four one-year options, to provide its Puma AE to the US Special Operations Command for its small unmanned aircraft system requirement. Under the (possible) $ 200 million contract AV will supply the hand-launched drone, ground control systems, spares, repairs and training. The ini-tial order for this award is a fully-funded $ six million.

EADS DEFENCE & SECURITY
Armada International, Switzerland
www.armadainternational.com
August/September 2008

EADS Defence & Security has produced its 500th target drone. The anniversary drone, designated Do-DT25-55, left the production facility on 26 June. The drones are built by EADS' Military Air Systems business unit and are designed to simulate threats from anti-radar guided missiles.

EUROSATORY 2008: The best so far?
By E. H. Biass, J. Keggler and I. Kemp
Armada International, Switzerland
www.armadainternational.com
August/September 2008

Spy Arrow

A model of the Thales Spy Arrow micro-drone was on display at the booth jointly sponsored by France's Délégation Générale de L'Armement defence procurement agency and GICAT (Groupement des Industriels Concernés par l'Armement Terrestre) land defence manufacturers association. Two versions of the Spy Arrow are being developed: the Spy Arrow LW (Low Weight) is intended for day missions while the Spy Arrow HC (High Capacity) is optimised for missions by night. The Spy Arrow LW has a maximum take-off weight of 500 grams, including a 100-gram payload which can be any suitable cots video camera. The Spy Arrow HC weighs 1200 grams, including a 200-gram payload, and carries an IR sensor developed by Thales. Both versions are fitted with a common IR sensor for flight stabilisation. Other payload options include chemical and biological sensors that can detect the presence of contamination and return with atmospheric samples for evaluation.
According to Thales the Spy Arrow uses 'simple technology taking best experience from the hobbyist model aircraft domain'. The Spy Arrow resembles a model of a jet fighter. It is driven by a rear-mounted engine and single pusher propeller and can achieve a speed of up to 100 km/h. It has an endurance of 30 minutes, which typically allows about 20 minutes of on site observation. The mission software can be installed on any suitable laptop computer to serve as a ground control station. It requires no specialist skills to operate the Spy Arrow, as it is fully autonomous from take-off to landing. The drone will fly a preprogrammed pattern and, if required by the mission, the software package will create a digital 'mosaic' image.
One of three Spy Arrow prototypes recently delivered to the DGA is being used for field trials by an unspecified French special forces unit while the others are being evaluated by the army's technical establishment. The army

service is planning to conduct an operational evaluation in Afghanistan. Thales is scheduled to deliver a 'small number' of production Spy Arrows early in 2009.

Guardium

Developed by a consortium called G-nius made up of IAI and Elbit, who had initially each and separately developed their own autonomous vehicles, the Guardium is now operational in Israel. Designed as a surveillance system, the vehicle patrols around its assigned watch path and in the process learns where all obstacles are, including heavy bumps or potholes. Having a layered electronics suite, the optical sensors and radars are linked to a central computer which decides on the sensors to be used depending on mission circumstances. Equipped with a non GPS-dependent navigation system, it relies on optical fibre gyros. As a sign of the times, the control station is very reminiscent of a computer game simulator, which helps operators to be quickly acquainted with the system. The audio system has a vehicle sound suppressor enabling its remote crew to receive a clear audio signal of the area covered. The vehicle can run for 24 hours before refuelling.

FORGOTTEN… AND NEW
By Eric H. Biass
Armada International, Switzerland
www.armadainternational.com
August/September 2008

Only a few days before Eurosatory opened its doors, EADS had finally given news of the SIDM programme, which had fallen into oblivion in many minds, so protracted its development had been over the past few years. The announcement that this French interim male drone had completed 'flight acceptance operations' and performance validation trials at Mont-de-Marsan base took more than one by surprise. The tests, which involved three IAI Heron TP-based airframes, had actually begun in December 2007. The aircraft and their two ground stations have already been handed over to the French DGA procurement agency. As the spelt out SIDM acronym for 'Système Intérimaire de Drone Male' indicates, this purely French programme is intended to bridge the surveillance drone requirement gap until the multinational Advanced UAV programme gets underway.
The SIDM development contract was originally announced in August 2001 with initial deliveries of the three drones and two ground stations slated for 2003 with the aim of replacing the air force's ageing Hunters. Blames for the delays are for the most part put on the fact that the programme initially was to be a non-developmental acquisition. However, a number of components became an export issue following the September attack on the Twin Towers in 2001, which led to the redevelopment of certain modules. In addition, it also appears that the satellite link system posed a number of integration problems. The difficulties encountered by the now defunct Euromale programme launched in 2004 also played a significant role in the delays as it caused a number of reprogramming issues and considerable budget overruns.

Enter SDM

The presence of a mock-up of what unashamedly looked like yet another Heron TP-based drone on Dassault's stand caused quite a stir at Eurosatory last June (see our cover photograph). Called the SDM (for Système de Drone Male) it is described by Dassault as a joint venture with Indra and Thales, with of course the participation of IAI, as a «pragmatic and competitive offer [that] would match the operational needs of both countries [France and Spain], and allow the supply to both armed forces of long-endurance UAVs for theatre surveillance within a very short timeframe. The first system could be operational as early as the end of 2012». To call a spade a spade, the aim behind what is in fact an unsolicited offer is to demonstrate the ability of the companies involved to deliver a system that would meet budgetary and time constraints. A way of gently cocking a snook at the Sidm? There is more into it than that. If it materialises, the SDM would de facto be an international programme, therefore with provisions for adaptability and flexibility.

Sperwer «Shrows»

Shrinking while growing is Sagem's method of modernising its Sperwer system. Known as the Sperwer Mk 2, the aim is to make the system deployable by C-130. Apart from a new 65-horsepower Rotax 582 engine offering better hot-and-high performance, the aircraft per se remains unchanged, the novelty residing in the launcher, the ground station and the external sensors. The launcher is a lighter and faster unit from Robonic, a firm that is now a subsidiary of Sagem. The ground station has been resized and redesigned to accommodate two operators instead of three and can now be mounted in the back of a 4 *X* 4 vehicle as opposed to residing in a truck-sized container, while the communications sensors are replaced by lighter tripod-mounted units - and if one adds that the maintenance shelter is replaced by a tent, the entire system can indeed fit into a Hercules.

Warrior Goes to War

A few days before the opening of Eurosatory, General Atomics revealed that two Sky Warrior Block Os were declared operational in Iraq. However, their initial deployment actually took place on 18 April for the first one and later

that month for the second. A derivative of the Predator, the Sky Warrior Block 0 is the result of a quick reaction programme to meet an urgent operational requirement from the US Army, but is also perceived as a gate to a significant risk reduction operation for the Block 1 developed for the extended range/multi-purpose programme, since it already uses the diesel engine and redundant avionics package design of the latter type.

Chatters

Or rather sans chatter, as the A-160 T Hummingbird features a fully rigid rotor. Literally three days before Eurosatory, the author was able to see an A-160 Hummingbird in the flesh at the firm's Phantom Works in Victorville in California. Developed under a contract from Darpa, the Hummingbird is aimed at exploring a variety of technologies, not least of which is to demonstrate the ability of a rotorcraft to reduce its rotor revolutions by 50% thanks to a two- speed turbo-shaft transmission and a very specific airfoil design to optimise efficiency depending on mission and flight conditions. The second aim is more cyber-oriented, though just as ambitious, and aims at enabling control of the bird to be passed from station to station. «We even successfully tried to fly it from the Internet,» said a Boeing official. Initially the all-composite fuselage Hummingbird was powered by a four-cylinder, then a six-cylinder Subaru engine, and it is now powered by a 550 horsepower Pratt & Whitney PW 207D turboshaft engine, hence the current T suffix. It has so far logged 63.6 flight hours in 18 sorties. A total of twelve `Ts will be ready by the end of 2008. Potential applications could include supply deliveries (the aircraft has a payload capacity of 450 kg) or even rescue missions, in which case it would be able to lift two downed pilots.

All-Euro Neuron

Manufacture of major composite subcomponents of the Neuron attack drone demonstrator being developed with Saab, Thales, HAI, EADS-CASA, Ruag and Alenia under the leadership of Dassault has recently begun, and assembly of these first elements should begin late next year or in early 2010. Saab is responsible for the fuselage, avionics, fuel system and part of the flight tests, while Thales is to deal with the ground station datalink and the interface with the command and communication centre. Italy is in charge of weaponisation (weapons bay and related electro-optical and infrared suite) and electrics. CASA is involved in the wing design and ground station while HAI in

Greece is handle the rear fuselage section, the engine nozzle and the assembly jig. Last but not least, Ruag in Switzerland is entrusted with the wind tunnel tests. One of the main aims of the programme is to validate the design of a non American-dependent demonstrator that could lay the basis for a combat aircraft as of 2015.

AN UNNERVING ENVIRONMENT

«Urban areas provide sanctuary, shielding, recruitment for extremists and provide fertile ground for humanitarian crises,» General William Wallace, the Commanding General of the US Army Training and Doctrine Command, told delegates at the 2008 Armor Conference at Fort Knox, Kentucky on *5 May*.

If current trends continue almost 60% (five billion) of population will live in urban areas by 2030

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The Marine Corps System Command (Marcorsyscom), briefing contenders bidding for the Combined Arms Military Operations in Urban Terrain (Camout) contracts, explained that extensive studies by the Marine Corps Warfighting Laboratory have shown that units trained to operate an integrated combined arms team are more successful within the urban battle spaces and suffer fewer casualties. The US Army and US Marine Corps are investing billions to improve their military operations in urban terrain (Mout) training facilities.

For example, the Camout project will expand the already extensive Mout training facility at the US Marine Corps's Air Ground Combat Center at Twenty-nine Palms, California where brigades participate in 'Mojave Viper', their final collective training exercise before deployment. Under a $ 460 million contract Allied Container Systems will build a primary town consisting of 1500 container (935), concrete (75) and modular (490) buildings which will be used for force-on-force and live-fire training. Scheduled for completion in April 2010 the town will consist of an 'urban core', an 'old town', four 'mixed use' areas and a sports stadium.

Since April 2007 battalions at Camp Lejeune, North Carolina have been using the US Marine Corps' first Mobile Mout facility; the $15 million facility covers 29 acres and consists of 71 buildings (five of with contain 360° shoot houses), more than 100 automated targets and two tunnel complexes. Marcorsyscom has subsequently awarded $ 30 million in contracts to provide modular Mout training systems at five of more locations on the Atlantic coast, $ 25 million for systems at five or more locations on the Pacific coast and another $ five million for facilities in Hawaii, Okinawa, Guam and other non-US locations. These Home Station Mout facilities will support training up to battalion level.

Important aspects of realistic urban operations training are the role players who act as enemy combatants, civilians, and members of non-governmental organisations, journalists and even foreign-language-speaking friendly forces. In April Marcorsyscom awarded Tatitlek a $ 319 million firm-fixed-price, indefinite-delivery/indefinite-quantity contract to provide specialist role players at Twenty-nine Palms until March 2013. Contract funds will not expire at the end of the current fiscal year.

General Dynamics Information Technology built the US Army's first advanced Mout site at the Joint Readiness Training Center at Fort Polk, Louisiana and has been awarded all of the service's follow-on Mout contracts. The company installed almost 1000 cameras, 350 microphones and more than three million feet of fibre-optic cable, which allows training supervisors to continuously observe, control, and record the conduct of training in real-time. Civilian contractors, such as Cubic, provide 1000 or more role players for the brigade-level exercises which take place each month. Over the past four years General Dynamics Information technology has also fielded Mobile Mout systems at locations in Afghanistan, Kuwait and Iraq. The mobile systems typically consist of one and two story buildings configured in a three to five-building site.

The Israel Defense Force's new National Urban Training Center (known by its Hebrew acronym Mali) achieved full operational capability in January 2008. The $ 45 million complex was funded by American military aid while the US Army Corps of Engineers (Ace) managed its construction. Principal subcontractors include Israel's state-owned Rafael and Cubic Defense Applications, which is providing its Multiple Integrated Laser Engagement System (Miles). At the heart of the complex is the twelve square km Baladia City (derived from balad, the Arabic word for village), which consists of 472 structures, seven km of paved and unpaved roads and an extensive network of underground tunnels and bunkers. Hundreds of Arabic-speaking IDF soldiers, many of them women, play the part of enemy combatants, civilians, humanitarian aid workers and journalists. Even before the centre opened it was being used to train IDF units and Israeli and US officials have stated that US forces are likely to begin training at Baladia in the near future.

The Ace is also managing the construction of a Mout facility at the King Abdullah II Special Operations Training Center in Jordan. The US Army Program Executive Office for Simulation, Training and Instrumentation (PEO STRI) awarded General Dynamics Information Technology a contract in November 2006 to build the fully instrumented site which will include 44 buildings in a 360° live-fire urban operations facility with adjoining training ranges. The total potential value of the contract if all options are exercised is $ 17 million.

Situational Awareness

US Defense Secretary Robert Gates visited the Army Evaluation Task Force (AETF) at Fort Bliss, Texas on 1 May

for an demonstration of the first of the four planned Future Combat Systems (FCS) 'spinouts' consisting of the Textron Tactical Unmanned Ground Sensor, which detects and reports on ground movement, the Textron Urban Unmanned Ground Sensor, which detects motion inside a building and the Raytheon Non-Line-of-Sight Launch System, nicknamed 'rockets in a box. During the demonstration Urban UGS units placed in the building relayed details about suspected insurgent activity to troops in nearby Bradley fighting vehicles. A squad drove forward and dismount to deploy an iRobot Small Unmanned Ground Vehicle (SUGV) into the building as a'point man'. The SUGV relayed real-time images of its findings allowing the platoon to plan its assault on the building.

The army is keen to expedite 'FCS-like' capabilities into service as soon as possible as Lieutenant General Stephen Speakes, US Army Deputy Chief of Staff, explained to the Senate Armed Services Subcommittee on 3 April. He mentioned that the Gas Micro Air Vehicle, an early precursor of the FCS Class I Unmanned Air Vehicle, has been «highly effective in navy explosive ordnance disposal operations in Iraq» and that it is planned to be used by 25th Infantry Division soldiers in Iraq this year.

The iRobot Packbot robot being used by soldiers and marines in Iraq and Afghanistan is the precursor of the FCS Small Unmanned Ground Vehicle. The man-packable robot has reportedly proven invaluable during urban warfare and explosive ordnance disposal (EOD) operations.

Under the 2006 iteration of the FCS fielding plan the army intended to field the XM156 Class I Unmanned Aerial Vehicle as part of the second 'spin out' in 2012, four years before the first FCS brigade combat team is due to be formed, and the SUGV as part of spin out 2. Current plans call for 81 SUGVs and 90 Class I UAVs to be fielded with each FCS brigade combat team.

However, the service is now seeking to field the two systems as soon as possible. Soldiers from the AETF started training in January on three SUGVs and XM156 Class I Block 0 prototypes. In total 25 SUGVs and 11 XM156s will be delivered for evaluation exercises scheduled to begin in June 2008. In September 2008 FCS and Training and Doctrine Command (Tradoc) officials will provide the army with a recommendation on whether to field the platforms or continue system development under the core FCS programme.

The XM156 is a platoon-level asset that provides the dismounted soldier with reconnaissance, surveillance, and target acquisition and laser designation. Total system weight, which includes the air vehicle, a control device, and ground support equipment is less than 51 pounds enabling it to carried in two custom Molle-type carriers. Gimbaled adjustable sensors allow soldiers to keep the vehicle in stationary hover while observing potential threats. Honeywell has produced 55 gMav technology demonstrators and prototypes for the FCS project since 2005.

The SUGV is the smallest ground platform in the FCS family and is intended to conduct reconnaissance, surveillance and target acquisition missions in buildings, tunnels, sewers and caves. It will be a smaller, lighter successor to iRobot's Packbot series, consisting of the Explorer, Scout and EOD models, more than 1000 of which have been deployed. The target weight for the SUGV is less than 13.6 kg, half the weight of the Packbot, with a modular 'plug-and-play' payload of up to 2.72 kg. It is intended to have an endurance of six hours and operate reliably up to 1000 metres from the operator above ground and up to 200 metres away in tunnels. The prototype SUGVs at Fort Bliss are fitted with commercial off-the-shelf sensors rather than the advanced C4ISR suite planned for the FCS, nor do they have the software-programmable Joint Tactical Radio System which will be used to transfer data within the FCS family.

Aerovironment has built more than 6000 hand-launched RQ-11A and RQ-11B Ravens, making it the most numerous drone system in the world today. The battery powered Raven B, designated the Rucksack Portable UAS, has an endurance of about 80 minutes and can operate over a radius of ten km sending back high-quality video images from an electro-optic or infrared camera both with x3 digital zoom. Each system consists of three aircraft, a hand-held ground control station, a remote viewing terminal, systems spares and support equipment.

Various organisations with the US Department of Defense are sponsoring efforts to develop miniature unmanned vehicles. Aerovironment (AV) developed the Wasp micro air vehicle under contract the US Defense Advanced Research Projects Agency (Darpa) to provide a small, quiet, portable, reliable and rugged air platform for front-line reconnaissance and surveillance over land or sea. According to Darpa the Wasp is capable of flying in excess of one hour, with a speed range of 32 to 65 km/h, and provides real-time imagery from relatively low altitudes. With only a 40-cm wingspan, weighing about 300 grams and fitting in a backpack, the Wasp serves as a reconnaissance platform for the company level and below by virtue of its extremely small size and quiet propulsion system. Wasp prototypes are being evaluated in-theatre by the US Marine Corps and the US Navy.

In March 2008 Aerovironment received a six-month, $ 636,000 Phase II contract from Darpa to design and build a flying prototype for the Nano Air Vehicle (Nav) programme. The project was launched by Darpa to develop a new class of air vehicles capable of indoor and outdoor operations in urban environments. AV completed a preliminary design review at the end of the Phase I of its Nav, which is designed to weigh no more than ten grams and carry a payload of up to two grams. If the Phase II demonstration is successful Darpa has the option to extend the programme for an additional 18 months.

BAE Systems signed a $ 38 million agreement with the US Army Research Laboratory in April 2008 to lead a team of scientists that will develop miniature UGVs to improve situational awareness in urban environments and complex terrain, such as mountains and caves. Micro Autonomous Systems and Technology (Mast) Collaborative Technology Alliance will develop an autonomous, multifunctional collection of miniature intelligence-gathering robots that can operate in places inaccessible or too dangerous for humans.

The Mast alliance will explore four primary research areas, led by four principal alliance members: BAE Systems

will lead Microsystems Integration, the University of Michigan will lead Micro-electronics, the University of Maryland will lead the Microsystem Mechanics and the University of Pennsylvania will lead Processing for Autonomous Operation. The alliance also has five additional members participating in one or more of the research areas: the University of California at Berkeley, the California Institute of Technology and the Jet Propulsion Laboratory, the Georgia Institute of Technology, the University of New Mexico and North Carolina Agricultural and Technical State University. Key areas of technology development include small-scale aeromechanics and ambulation, propulsion, sensing, processing and communications, navigation and control, micro devices and integration, platform packaging and systems architectures. The alliance has a planned duration of five years with an option to extend to the contract for an additional five years.

Foster-Miller, an American subsidiary of QinetiQ, announced in May 2008 the delivery of its 2000th Talon EOD UGV to US Department of Defense customers A more significant milestone occurred later in the month with Foster-Miller receiving a new $ 400 million indefinite-delivery/indefinite-quantity contract for additional Talon replacement parts; the award replaced the $ 150 million IDIQ contract in early 2007 which has since been fully funded. The standard Talon weighs about 45 kg and can be remotely operated at ranges up to 1000 metres. Under contract to the US Army's Armament Research, Development, and Engineering Center Foster-Miller developed the Special Weapons Observation Reconnaissance Detection System (Swords) variant of the Talon. The Swords can be armed with an M240 7.62-mm or an M249 5.56-mm machine gun, the Barrett 12.7-mm sniper rifle and other light weapons. With the M249 fitted to the Swords weighs 196 pounds and can achieve a top speed of approximately eight km/h. The Swords became the first weaponised UGV to be deployed in-theatre when it accompanied the 3rd Infantry Division to Iraq in mid-2007.

Based on user feedback Foster-Miller developed the Swords 2, which was unveiled last year as the Modular Advanced Armed Robotic System (Maars), The purpose-built chassis provides a uni-body frame with easier battery and electronics accessibility, a larger payload bay, greater speed and better manoeuvrability. The new digital control unit 'significantly' improves command and control and situational awareness for the operator. The turret-mounted M240B machine gun can be quickly replaced with an articulated arm so the Maars can be used as an IED identification and neutralization tool. The complete system weighs about 160 kg.

Foster-Miller expanded its robot portfolio in June 2007 through the acquisition of Automatika which developed the light-weight Dragon Runner Mobile Ground Sensor System in collaboration with Carnegie Mellon's Robotics Institute and the US Marine Corps Warfighting Laboratory. Weighing about four kg and measuring 39.4 cm long, 28.6 cm wide and 12.7 cm high, the Dragon Runner fits inside a marine's rucksack along with its hand-held controller which incorporates a small screen. Intended for use at the squad, platoon and company level primarily for operations in an urban or desert environment the robot's suspension system enables it to be thrown through windows, up stairs or over walls. It also has a 'sentry mode' using its several on-board sensors to provide real-time imagery and audio alerts. About 20 systems have been deployed to Iraq for field trials.

The Israel Defense Force funded Elbit Systems to develop the Viper (Versatile, Intelligent and Portable Robot) as part of its Portable Unmanned Ground Vehicle programme. The Viper weighs about eleven kg and measures 30 *x* 40 cm, enabling it to be carried inside a soldier's backpack. If features a new integrated wheeled-track system powered by two electric motors which enable it to climb stairs and overcome other obstacles. A 'scorpion tail' elevates the payload and stabilises the platform. The Viper can be equipped with a range of payloads such as day/night cameras, explosive detectors, a 9 mm mini-Uzi submachine gun, grenade launchers and a robotic arm. The Viper is expected to be fielded initially to special forces units but eventually the army plans to equip each infantry platoon with the system.

Urban Snipers

PEO Soldier describes the US Army's new 7.62 mm M110 Semi-Automatic Sniper Systems (Sass) as a weapon 'designed for the urban fight'. In 2007 Knight's Armament began delivering the first of 4492 M110s the army plans to buy to replace the bolt-action Remington 7.62 mm M24 Sniper Weapon System.The Sass requirement stipulated that the selected rifle design had to be capable of delivering precision fire against personnel and soft-skinned materiel targets out to a range of 1000 metres. The M110 is optimised to fire M118LR long-range ammunition but can also fire standard 7.62 x 51 mm ammunition including the M993 armour piercing round. To improve survivability the weapon is fitted with a flash/sound suppressor. The rifle is supplied as a complete system with shipping container, 10, 15 and 20-round magazines and the new Leupold XM151 Spalding telescope. According to PEO Soldier one of the major improvements that the M110 will provide in the urban environment is, «the higher rate of fire, allowing snipers to target insurgents accurately and quick in civilian dense areas». One army non-commissioned officer noted that replacing the bolt-action M24 means, «I don't have to have my shooter carry an extra weapon when we go into buildings to clear rooms.

He can actually use the M110. That's going to lighten our load a lot».

The British Ministry of Defence awarded Accuracy International a contract to supply 580 .338 calibre (8.6 mm) Artic Warfare sniper rifles, under the designation L115A3, to replace the 20-year-old 7.62 mm L96A1s also made by the Portsmouth firm. The boost in calibre extends the range of the Britain's sniper weapon capability from 1000 to 1500 metres. Fed from a five-round magazine the bolt-action rifle weighs 6.8 kg and measures 1300 mm in length.

A number of small arms detection systems (Sads) are being offered for the difficult task of locating snipers in an urban environment. Early in 2008 an unspecified number of US soldiers in Iraq began field trials of the Soldier-Worn

Acoustic Targeting System (Swats), developed by Planning Systems (PSI), a subsidiary of Qinetiq North America, for the US Army Program Executive Office Soldier. The company's complete Ears gunshot localisation system also includes Ears-VM (Vehicle Mounted), Ears-FS (Fixed Site), Ears-MC (Mobile Checkpoint), and Ears-UG (Unattended Ground) configurations. The Ears-VM and Ears-FS have been deployed in Afghanistan since August 2007; for these applications Ears uses a 15-cm hemispherical sensor weighing less than 2.25 kg that is capable of determining the position of a sniper in less than one second. The single Swats sensor measures 7.62 cm x 7.62 cm x 1.9 cm and weighs less than 500 grams. It provides an audio, visual or digital alert providing an accurate position of sniper locations at ranges beyond 300 metres.

Darpa's requirement for a vehicle-mounted Sads system that would localise snipers firing at an HMMWV travelling at up to 95 km/h has resulted in the Boomerang, which is jointly sponsored by the US Marine Corps Warfighting Laboratory. BBN Technologies exploited its earlier work in developing the Acoustic Counter-Sniper System to produce prototypes for the Boomerang. Mounted on a short mast the Boomerang microphones detect bullets passing within 30 metres of the mast by both the shock wave that bullets create and by the muzzle blast from a weapon. In less than two seconds the system provides the distance, direction and azimuth to the source of the gunfire. Information is delivered by both a voice announcement and a visual image on an LED display. The system has undergone extensive operational trials in Iraq.

AAI believes that its PDCue system, which utilises sensor clusters housed in modules positioned at the four corners of a vehicle, offers an advantage over a 'single-mast system'. According to AAI the system provides a much more accurate indication of the firing point at ranges out to 1.2 km as well as offering added survivability through redundancy. The US Army has installed the PDCue on the Stryker and HMMWV for operational trials.

Since 2005 Canadian Army Coyote 8 x 8 armoured reconnaissance vehicles in Afghanistan have been fitted with the Ferret Small Arms Detection and Localization System developed by MacDonald Dettwiler & Associates in collaboration with Defence Research Establishment Valcartier. Using acoustics from the rifle's muzzle blast and shock wave the Ferret indicates the bearing, elevation and range to the firing point; it also determines near miss distance and the calibre of the projectile. The system has been upgraded to provide a voice warning in place of the original audible tone, and when linked to a global positioning system receiver will provide a ten-figure grid reference for the firing point.

Soldiers in urban operations experience a high number of wounds to the head and upper torso as they look around corners, over walls and through windows. The Israeli-US company Corner Shot has expanded its range of small arms mounts designed to shot around corners, thus minimising the risk to the firer. The first weapon, unveiled in late 2003, consists of a gun frame with a video display and a forward pistol mount with camera attached that can be swivelled to the left and right. The effective range depends on the pistol used; the company cites a range of 100 metres for 9 mm,.40 calibre and.45 calibre pistols and 200 metres when used with FN Herstal's 5.7 mm FiveseveN pistol. The Corner Shot weighs 3.86 kg, plus the weight of the pistol, and measures 820 mm in length with the stock extended or 640 mm with the stock folded. For extended surveillance and to improve accuracy a lightweight bipod can be fitted to the pistol mount. The Corner Shot APR (for Assault Pistol Rifle) incorporates a small 5.56 mm assault rifle instead of a pistol, enabling the user to engage targets at ranges of up to 250 metres. It uses standard M16 / M4 magazines or specially designed shortened magazines and can fire all 5.56-mm ammunition types. The latest member of the family is the Corner Shot 40 Personal Grenade Launcher, which provides the extended range and enhanced firepower of a 40-mm grenade launcher. The weapon weighs 4.4 kg and measures 900 mm in length with the stock open.

Australia's Defence Science and Technology Organisation (DSTO) developed the Off-Axis Viewing Device (OAVD), which can be attached to standard service weapons to reduce the vulnerability of troops in urban operations. The first 130 units were fielded with troops in Iraq in March 2005, only four months after the project began. Since September 2005 the device has also been used by Australian special forces in Afghanistan and the army intends to make the OAVD a standard accessory for its small arms. The OAVD weighs about 500 grams and measures 150 mm in length and can be clipped to the standard optical sights on the F88 Steyr 5.56 mm assault rifle, the F89 Minimi 5.56 mm light machine gun and the M4 carbine. Two oval-shaped mirrors within the sealed OAVD reflect the image from the weapon's optical sight to the soldier, who is able to search for and engage targets while keeping his head and upper torso behind cover. When not needed the OAVD is rotated away from the weapon's standard sight. Under licence from the DSTO, Swedish company Aimpoint is to manufacture a production standard model named the Concealed Engagement Unit.

ShieldShot of Austin, Texas manufactures the Tactical Mirror Sight (TMS), which mounts on the rail of an assault rifle behind any red dot sight. The TMS flips into its mirror position to aim and shoot around corners, or flips to a back-up iron sight position, or flips down out of the way for conventional aiming through the optical sight. The TMS can be positioned for both right- and left-hand shooting. The TMS kit also includes a large mirror to use for building clearing and for shooting over high walls; the unit snaps over the smaller mirror. The TMS is in service with US special operations forces in various theatres.

Breaking Down Doors

The 'door buster' is the nickname US marines have given to the M1014 Joint Service Combat Shotgun developed by Benelli Armi of Italy as the M4 Super 90. The have fielded almost 4000 weapons since 2002 and the designation as a 'joint' system could lead to further orders from the other services. The weapon weighs 3.8 kg with an empty

magazine and features a stock that can be extended to increase the weapon's length from 88.6 to 101 cm. It features a MIL-STD-1913 Picatinny rail interface on the top so various day and night sights and other accessories can be mounted. The semi-automatic weapon is fed from a tubular magazine that holds six 12-gauge rounds. Ammunition types include rifled slugs, buckshot, birdshot, 'lock buster' and CS rounds.
The US Army is fielding the C-More Systems XM26 Modular Accessory Shotgun System as an attachment for the M4 Modular Weapon System or for uses as a stand-alone weapon. Fed from a five-round magazine the M26 fires all standard lethal, non-lethal and door-breaching 12-gauge ammunition including the new M-1030 cartridge approved for full materiel release in late 2007. The M-1030 is an anti-material cartridge designed to be used for defeating wooden doors (deadbolts, knobs and hinges) and padlock hasps. The frangible projectile of the M-1030 minimizes the risks associated with the buckshot breaching cartridge previously used.
For an assault entry US Army soldiers can use the M100 Grenade Rifle Entry Munition (Grem) developed by Israel's Rafael Advanced Defense Systems. «This is a great step from the standpoint of survivability for soldiers,» according to Barbara Muldowney, Deputy Product Manager for Individual Weapons at Ardec. «Previously, to blow a door, soldiers had to run across the street, put their charges on the door and then run back to set them off before going through the door. If there was a sniper on top of a nearby building those soldiers were at risk. Now they can be across the street, in hiding, and use the Grem to blow the door open to allow our forces to go in and overcome whoever is inside.»
Small numbers of Grems were fielded with the 101st Airborne Division in Iraq in 2006 and the US Army selected Grem as of the top ten greatest inventions in 2005 for army use. The M100 is derived from Rafael's Simon, a self-contained munition that is launched from standard 5.56-mm assault rifles to smash open steel or wooden doors. The Simon is in service with the Israel Defense Force, the armies of Canada and the UK, and Rafael has developed a version that can be fired from the Nexter Famas and other short barrel 5.56-mm assault rifles.
In US service the Grem is launched from the M16 rifle or M4 carbine using standard ball or tracer ammunition at ranges of 9 to 33 metres from a door. A standoff rod detonates the munition at the correct distance from the door to ensure that the blast is dissipated across the door's surface, blowing it in. Whereas the standard Simon warhead has 150 grams of explosive the Grem warhead contains 120 grams of insensitive explosive. Soldiers tasked to use the M100 will carry two munitions and a butt pad, which is fitted to their weapon before firing to absorb the additional recoil. The army plans to buy approximately 8000 Grems and 50,000 Grem-target Practice munitions each year.

Smashing the Wall

Operations in Iraq and Afghanistan have increased the demand for lightweight assault weapons that can be carried by soldiers on foot patrol and used to defeat enemy combatants in buildings and improvised bunkers.
In this operational context the popularity of the Nammo 66 mm M72 Light Anti-armour Weapon (Law), first used by US troops during the Vietnam War and phased out of US service in the 1980s in favour of heavier weapons designed to defeat Soviet main battle tanks, has been revived. The company's recently acquired US subsidiary, Nammo Talley, developed the M72A4, A5 and A6 Improved Laws and the newer A7 model. The US Department of Defense has bought more than 10,000 M72A6s, which combines a lower penetration capability with an enhanced blast effect, and M72A7 Laws for use in urban operations in Iraq.
Nammo Talley has recently developed the Next-Generation Law family which consists of three models: the M72A8, which combines the M72A7 warhead with a confined space propulsion system; the M72A9 is a high-penetration weapon intended to be used against armoured vehicles and the M72A10 with a blast/fragmentation warhead for use against personnel Nammo Talley has recently completed an USD 8.000.000 firm-fixed-price contract from the Naval Surface Warfare Center, Crane Division, in August 2007 to produce 1287 M72A7 Laws and 1833 M72A9 Law Anti-Structure Munition (ASM) rounds.
Nammo developed the M72 EC (Enhanced Capacity) Law and the M72 ASM RC (Anti-Structure Munition Reduced Calibre). The EC Law, which was qualified in 2006, offers an improved launcher and warhead, and a new dual safety fuse. The M72 ASM RC uses the same launcher and rocket motor as the EC Law; the firer can select either the 'superquick' mode to make a large hole in a double brick wall or the 'delay' mode for the warhead to penetrate the wall and explode inside.
Early this year Nammo Talley completed deliveries of 3000 thermobaric MK 80 NE (for Novel Explosive) thermobaric rockets for its 83 mm Shoulder-launched Multipurpose Assault Weapon (Smaw) in service with the US Marine Corps under a USD 14.000.000 contract awarded in October 2006. The Smaw-NE was developed and fielded by Nammo Talley, the Naval Surface Warfare Center and the Marine Corps Systems Command in response to an urgent US Marine Corps request in 2002 and the first 400 rockets were deployed in Iraq in March 2003. «The Smaw, particularly with the thermobaric round, has proven to be one of the most effective weapons used during urban combat in Iraq,» wrote an US Marine Corps infantry officer in the April 2007 Marine Corps Gazette. «Many observers have pointed them out as one of if not the key infantry weapon during the battle of Fallujah in November 2004 and have recommended that the numbers be increased so that one can be provided in support of each squad.»
The Smaw, based on the IMI B-300, has been in US Marine Corps service for 20 years and was previously used with the high-explosive, dual-purpose (HEDP) rocket against bunkers, masonry and concrete walls, and light armour and high explosive anti-armour rocket against AFVs. Nammo Talley used the HEDP rocket to develop the M141 Disposable Smaw (Smaw-D) to meet a US Army requirement for a Bunker Defeat Munition. According to the army

the Smaw-D system is fully operational at eleven metres, making it an optimum weapon for military operations in urban terrain. Several thousand rounds were produced in the late 1990s and since the start of the war on terrorism Nammo Talley has produced several thousand more to replace weapons used to attack bunkers and caves in Afghanistan and Iraq. The Smaw-D weighs 7.26 kg in an 813-mm long launch tube. A $ 26 million firm-fixed price contract awarded in March 2008 will extend production for a further five years.

The Saab Bofors Dynamics 84-mm AT4, under the US designation M136, is the standard Law in US Army and US Marine Corps service. In May the company completed a $ seven million US Marine Corps contract for 3500 M136 Laws placed twelve months earlier; options could take the value of the contract to USD 40.000.000.

To expand the weapons utility in an urban environment the Swedish company developed the AT4CS (for Confined Space) and the high penetration AT4CS HP which can punch through more than 500 mm of armour. The British, Danish, French and US armies have bought the AT4CS HP. The AT4CS Heat RS (for reduced sensitivity) rocket has been developed to meet the needs of the US Special Operations Command (Socom).

The US Army is using funding provided through the Department of Defense's Foreign Comparative Testing (FCT) programme to evaluate an Enhanced Blast Tandem Warhead for the AT4 CS for use in urban operations. The army has indicated a potential requirement for 5000 weapons annually and is now evaluating the results of a ten-month test programme completed earlier this year.

Also under the FCT programme Socom funded Saab Bofors Dynamics to develop a Multi-Target (MT) round for its venerable 84-mm Carl Gustaf recoilless rifle, which is in service as the Multi-Role Anti-armor Anti-personnel Weapon System (Maaws). The new round is based upon the Heat 751 tandem war-head with a follow-through charge optimised for use in urban/built up areas. Socom has stipulated that the MT war-head must penetrate 30 cm of triple brick and 20 cm of reinforced concrete to provide a 'kill behind wall' capability. The Department of Defense's FY08 Gwot supplemental funding request includes $ 6.6 million for 2000 84-mm MT 756 and 3000 40-mm rounds. The 40-mm round is the latest addition to the Maaws muni-tions family and replaces both the High Explosive and High Explosive Dual Purpose rounds. In May Saab received a $ 48 million contract for additional weapons and ammunition for delivery in 2009.

IMI's shoulder-launched Shipon UT uses the combat-proven S-300/Smaw propulsion system to deliver anti-tank and anti-fortification/anti-personnel rockets to a range of 600 metres. The bunker buster is designed to penetrate walls and explode inside the target for maximum effect. The fire control system, which incorporates a laser rangefinder, ballistics and fuze control processor, and night vision capability, is the only reusable element mounted on the disposable launch canister. The Shipon weighs nine kg ready to launch. Extended range rockets are also under development.

The Bunkerfaust (Bkf) munition was developed by Dynamit Nobel Defence (DND) at the request of the German Army so that it could use its DND Panzerfaust 3 (Pzf 3) anti-armour system to defeat targets behind walls. The standard Pzf 3 Heat warhead incorporates an extendable spike that detonates the shaped charge at the optimal standoff distance from vehicles, enabling it to penetrate more than 800 mm of armour, and when the spike is retracted the warhead acts like a high explosive squash head (Hesh) round, thus causing significantly more damage to walls. The € 40 million contract placed by the Nether-lands in 2004 for the Pzf 3 included 1500 Bkf muntions.

British forces are using the AT4 CS as an interim measure until the introduction in 2009 of its new Anti-Structure Munition (ASM), which will enable infantry units to 'defeat hardened structures such as buildings or bunkers more precisely and safely, and without recourse to artillery or air support'.

Dynamit Nobel Defence was selected in February 2006 to develop, supply and support the ASM in a programme expected to be worth about £ 40 million in the first five years. The ASM is based the 90-mm Matador (Man-portable Anti-Tank, Anti-DOoR) Law that DND developed for the Singapore Armed Forces. The 9.8-kg weapon, marketed internationally as the Panzerfaust (Pzf) 90, is designed for use in urban operations. Its multi-purpose warhead, designed by Rafael Defense (DND's parent company), is effective against fortifications and armoured vehicles out to 500 metres and in the delay mode the warhead punches a 450-mm diameter hole in a triple brick wall. The ASM for the British Army can be programmed before launch to achieve either a maximum breaching effect or a greater behind-armour effect.

Rafael and DND produce other weapons optimised for urban operations. The Matador WB (for Wall Breacher) uses an 'explosively formed ring' warhead to blast a 75 to 100-cm hole in a double brick wall while two munitions will blast a hole in a triple brick wall or a double reinforced concrete wall. The weapon has a range of 20 to 100 metres. German forces US and coalition forces have fired more than 6000 Lockheed Martin Hellfire II missiles in their war against terrorism. Because of the confined complex urban environment, the Hellfire was the weapon of choice for its precision and effects - minimizing collateral damage while still achieving the ground commander's intent - wrote an AH-64 Apache pilot of the US Army's 3rd Armored Cavalry Regiment in September 2005. US Air Force MQ-1 Predator and MQ-9 Reaper drones now routinely launch Hellfires during their patrols. The Hellfire II family includes four variants:

- the AGM-114K Heat missile which can defeat all known and projected armoured threats, according to the manufacturer;
- the AGM-114M blast fragmentation missile which defeats soft targets such as ships, buildings, bunkers and light armoured vehicles;
- the AGM-114N metal augmented charge missile designed for use against enemy forces in buildings, bunkers, caves and other enclosures;
- the recently introduced AGM-114K-A missile with an augmented Heat warhead which adds blast fragmentation to the Heat warhead's anti-tank capability for use against soft targets in the open.

Lockheed Martin developed the AGM-114N in response to a US Marine Corps urgent operational requirement for a Hellfire II warhead optimised to attack multi-room structures, bunkers and caves following the 2001 invasion of Afghanistan. The missile is fitted with a 3.63-kg thermobaric warhead that creates a sustained pressure wave. The missile uses the same guidance and control section and the propulsion section as the AGM-114K/AGM-114M missiles and incorporates the same electronic safe, arm/fire device as the AGM-114M.
The Department of Defense approved the AGM-114N Mac (Metal Augmented Charge) missile for accelerated full-rate production in August 2005. Lockheed Martin officials reported that early versions of the Mac-configured Hellfire have already been combat-proven in Iraq and have been cited by the administration as meeting an urgent requirement to suppress terrorists in urban areas. The missile is reportedly capable of reaching around corners to strike enemy forces hiding in cases, bunkers and hardened multi-room complexes. Coupled with the Hellfire's highly accurate semi-active laser seeker, the Mac warhead provides the ability to take out targets in urban environments with high lethality and minimal collateral damage.
The French Army is buying M299 four-rail launchers and multiple warhead variants of the Hellfire II to equip its new Eurocopter Tiger Hélicoptère d'Appui Destruction attack helicopters.
Under the US Department of Defense's Foreign Comparative Test programme Ardec is considering the results of a recent evaluation of 70-mm Multi-Purpose Penetration Warheads supplied by Nammo in 2007 to determine if they would give the AH-6J helicopters of the
160th Special Operations Aviation Regiment 'a significant new capability to defeat hardened targets such as buildings and bunkers'. The 70-mm MPP, a derivative of Nammo's RA79 warhead, will be used on the 2.75-inch Hydra rocket. The warhead is in already used on Danish and Norwegian F-16 fighters and British Army AH-1 Apache attack helicopters.
The US Army funded the development of a bunker buster warhead for Raytheon's BGM-71 Tow missile for use with the General Dynamics Land Systems - Canada M1134 Stryker Anti-Tank Guided Missile vehicle. Each of the army's Stryker Brigade Combat Teams has an anti-armour company of three platoons each with three Stryker ATGM vehicles armed with an elevating twin Tow missile launcher. The Tow bunker buster leverages work that was done in developing the blast-fragmentation warhead for Hellfire missile. The army awarded the first production contract in June 2005 and the Canadian Army later bought 462 missiles. The army plans to keep improved Tow missiles in service through 2025.
The shoulder-launched Raytheon/ Lockheed Martin Javelin medium-range fire-and-forget missile is another anti-tank missile that has excelled as a 'bunker buster'. The after action report of the US Army's 3rd Infantry Division (Mechanized) following the 2003 invasion of Iraq stated: «The Javelin missile was an invaluable weapon in defeating enemy armored forces and reinforced positions to include bunkers, building, and revetments. There is no other weapon that can support dismounted infantry in fighting against these types of engagements. The command launch unit (CLU) provided day and night capability with the Javelin missile as well as provided vehicles without
[Long Range Advanced Scout Surveillance System] and dismounted infantry-men with a means of thermal observation out to four km.» The army plans to integrate the Javelin with the Kongsberg M151 Protector Remote Weapon Station fitted on its M1126 Stryker Infantry Carrier Vehicles. Production of the improved Block 1 missile and launch unit began in September 2006. It features an enhanced rocket motor that reduces the missile's time of flight, improvements to the laucher, includes software enhancements and improvement to the warhead to increase lethality against a wider range of target sets. Planned enhancements include extending the missile's range. The Javelin has been sold to nine countries and other sales are being negotiated.
The Israel Defense Force (IDF) routinely uses helicopter-launched missiles as the weapon-of-choice to target insurgents in urban areas. Rafael developed the Spike to meet the IDF's demanding requirements for an ATGW family that could be used in the dismounted role, on ground platforms and on helicopters.
The family consists of the 800-metre Spike-SR, the 2500-metre-range Spike-MR (previously known as the Gill), the 4000-metre Spike-LR and the 8000-metre Spike-ER (previously known as NTD Dandy). The fire-and-forget Spike-MR and Spike-LR share the same launcher and missile although the Spike-LR can also be supplied with a two-way fibre-optic datalink. The Spike was initially fielded with a shaped tandem-charge warhead to defeat tanks equipped with explosive reactive armour. Rafael has since completed development of its Penetration, Blast and Fragmentation warhead for the Spike-ER 'to fulfil the needs of its customers for an effective/ minimal collateral damage weapon system for urban and anti-terror warfare, low-intensity conflicts and high value targets'. The Spike has been sold to the Czech Republic, Italy, Finland, the Netherlands, Poland, Romania, Singapore, Spain and unspecified customers in South America and elsewhere.
France's Délégation Générale pour l'Armement, on behalf of the French and German armies, is testing MBDA's new Milan ER (Extended Response) missile and new ADT (ADvanced Technologies) firing post. MBDA has produced more than 10,000 firing posts and 360,000 Milan wire-guided medium-range missiles for 43 customers since 1974. Both the French and German armies are considering the Milan ER to replace earlier generation missiles. The Milan ER retains the weapon's proven wire-guidance system but extends the range from 1950 to 3000 metres. Ruag has developed a new dual-purpose 115-mm warhead that is able to pierce more than 1.1 metres of armour protected by reactive armour or smash a hole through 2.5 metres of concrete. The integral thermal imager enables targets to be tracked and engaged in almost all weather conditions while a video input/output system enables remote operation. The fully digital system incorporates built-in test facilities, improved maintenance and a training system. During troop trials in South Africa earlier this year the newly trained operators struck the target with each of the ten missiles fired.

The German Army has a requirement for a light multi-role missile (MEhrrol-lenf higes Leichtes Lenkflugkdrpersystem or Mells) to replace its present Milan systems. The army is seeking a weapon with a 4000-metre range that can be used against a wide target set in both 'fire and observe' and 'fire and forget' modes. Can-didate systems include the Milan ADT/ER, the Javelin and the Eurospike offered by Diehl BGT Defence, Rheinmetall Defence and Rafael.

Urban Heavyweights

«The tank was not designed to do what it's doing now in Iraq,» said Captain David Centeno, assistant product manager of the Tank Urban Survival Kit (Tusk) project, at the 2007 Armor Warfighting Conference at Fort Knox, Kentucky. «You take this massive tank and put it in the middle of a city, now you have to design something to enable it to survive and still do its mission in a city.» The US Army's solution is the Tusk system, developed by General Dynamics at the request of the US Army's Ml tank project manager. Based on extensive feedback from Ml crews the package is intended to reduce the vulnerability of tanks operating in urban environments in Iraq.
In 2007 the service began installing Tusk elements on M1A1 and M1A2 tanks in country. The complete Tusk package, which now includes Tusk II and III enhancements, comprises:

- Abrams Reactive Armor Tiles (Arats) fitted to the sides of the hull to provide enhanced protection against Heat war-heads fired from hand-held weapons such as RPGs;
- shaped belly armour to divert the blast of a roadside bomb and a new driver's seat which provides better protection. This aluminium armour, which weighs about 1500 kg, can be fitted in two hours;
- the stabilised Counter-Sniper/Anti-Materiel Mount which enables an M2 12.7-mm heavy machine gun to be mounted above the Ml's 120-mm main armament. The M2 slews with the tank's main gun and gives the crew a weapon to accurately engage targets without using the main armament or exposing themselves;
- the Crows remote operated weapon station armed with an M2 12.7-mm heavy machine gun operated by the tank commander. The weapon can be elevated from -20° to +60°;
- a Loader's Armored Gun Shield (Lags) with transparent armour panels t a thermal weapon sight for the loader's machine gun;
- a thermal Driver's Vision Enhancer to improve the driver's vision at night and in poor visibility conditions;
- a situational awareness camera mount-ed on the rear of the turret bustle which enables the loader to scan a 180° arc cov-ering the rear of the tank;
- a tank infantry phone mounted at the rear of the chassis to enable infantrymen to talk directly to the tank crew and assist in directing fire;
- a power distribution box with circuit protection to support the various Tusk elements.

The Tusk is a modular package that enables the user to install those elements most appropriate for the threat. GDLS received a $ 45 million contract in August 2006 to produce 505 Tusk sets with Arat production funded in a separate $ 59 million contract. In December 2006 GDLS received an $ eleven million contract modification to an award potentially worth up to $ 60 million to produce 250 mine floors. The service's goal is to ship 565 kits to Iraq so that all tanks will be fitted with the Tusk by the third quarter of 2008. The army's fielding plan will remove tanks from operation for as little time as possible; units will be able to install the complete Tusk in the field in about twelve hours and the following day will be trained on the new equipment. Elements of the Tusk package are also being fielded to tanks not deployed in Iraq; for example, in April the army ordered 2832 Lags.
The US Marine Corps intends to fit elements of the Tusk to its M1 fleet.
The Australian Army acquired 59 ex-US Army M1A1 Aim tanks under project Land 907 to replace its fleet of Leopard 1 tanks. In the second phase of the project the service tentatively plans to spend between A$ 150 and A$ 200 million to upgrade the Ml to a standard similar to the Tusk.
BAE Systems Land Systems is providing the US Army with 952 Bradley Urban Operations and Survivability Kit (Busk) to improve the effectiveness of the M2 Infantry Fighting Vehicle and M3 Cavalry Fighting Vehicle in urban operations. The primary components of the Busk are:

- a Commander's Light Automatic Weapon (Claw) mounted on the CIV and integrated with the A3 fire control system so that it can be fired under armour with existing fire control components. The Claw can be either the 5.56mm M249 Squad Automatic Weapon or the 5.56mm M231 Firing Port Weapon;
- enhanced protection against mine and IED explosions;
- a high-powered, hand-held battle command spotlight which provides three million candlepower using 24-volt vehicle power and an existing connector. This can be used to search for IEDs placed along roads at night and to identify vehicles at a standoff distance before they approached traffic control points;
- a lightweight, non-conductive 'dome tent' structure to protect the turret and crew from low hanging electrical power lines at speeds up to 30 mph;
- external optical components, such as the Commander's Independent Viewer (CIV) on the A3 model, are protected by a mesh encased in a steel frame which does not affect normal sighting functions.

The Israel Defense Force has extensive experience of low-intensity conflict and urban operations which is reflected in the upgrade kits developed for its Merkava Mk 3 and Mk 4 tanks. The kit for the Mk 3 includes a heavier bottom plate better able to withstand the blast of large IEDs. The 12.7mm machine gun mounted on top of the tank's 120mm main gun is linked to the fire control system so that the gunner can fire it under armour protection. The commander's cupola has been

redesigned to improve visibility. Marking poles are mounted on the extremities of the tank so that it is easier for the commander and driver to manoeuvre in confined spaces. Steel mesh is fitted to protection optics, intakes and exhausts. An observation window and firing hatch are mounted in the rear door so that a sniper can ride in the rear compartment to provide close protection. The kit for the Mk 4 includes more advanced elements:

- a hunter-killer sight developed by ODF Optronics is mounted on a mast on the turret roof to improve the commander's situational awareness an overhead weapon station that will be operated by the loader;
- the Vectrop Tank Sight System which mounts four protected cameras in blind spots around the tank to provide the driver with rear and side views;
- a front-mounted ram to enable the Merkava to clear barricades and other obstacles;
- an active protection system will also be fitted. The Rafael Trophy system is now being installed on an unspecified number of tanks although Israel Military Industries is promoting its Iron Fist system for further upgrades.

The British Army contingent serving in Iraq still includes a squadron of Challenger 2 tanks. The rationale was explained by Brigadier David Ruther-ford-Jones, the Director Royal Armoured Corps, when he said, «The contemporary operating environment is often urban, and this poses challenges in all sorts of ways. Recent experience in both Iraq and Afghanistan have taught us that urban terrain can no longer be considered a no-go area for armoured fighting vehicles. Challenger 2 has proven itself once again to be reassuring to light forces, particularly in high threat urban environments - the two capabilities compliment each other. That said; tanks are vulnerable if required to operate on their own in built-up areas. The US Army has lost quite a number of tanks to date in Iraq, the majority in urban environments. The lesson is combined arms grouping.»

In 2007 a new passive armour package was fitted to the turrets of Challenger 2 deployed in Iraq as well as bar armour to the rear of the tank's chassis and turret bustle to protect against RPGs fired at close ranges.

Brigadier Rutherford-Jones also noted that not only are the engagement ranges shorter, but the very nature of the urban terrain and threats renders the main armament and coaxial machine gun less useful. Through an Urgent Operational Requirement the Selex Communications Enforcer Remote Control Weapon Station armed with a 7.62-mm machine gun has been fitted at the Challenger 2 loader's position.

The Service Technique de l'Armée de Terre (French Army technical service) awarded contracts in March 2006 to Nexter (Leclerc tank), Renault (6 x 6 VAB armoured personnel carrier) and Panhard (4 *X* 4 VBL scout vehicle) to develop Action en Zone URbaine (Azur) modification kits for these vehicles. Prototypes were unveiled at Eurosatory 2006 and were later shipped to the recently opened Centre d'entraînement en zone urbaine (urban training centre) at Sissonne for an initial evaluation in November and December 2006. The service is evaluating the results of these and other trials conducted in 2007.

On the Leclerc Azur the original side skirts have been replaced by new passive armour skirts and bar armour has been fitted around the rear of the hull. Additional armour has been fitted to the turret roof and protection against petrol bombs has been installed over the rear engine decks. To provide close protection a remote control weapon station fitted with a .50-calibre heavy machine gun is mounted on the roof along with a 360° panoramic sight for the tank commander. A close range communication system is provided to enable dismounted infantry-men to coordinate theirs actions with tank crews. The VBL Azur demonstrator incorporates a 360° surveillance device, a non-lethal grenade launcher, smoke dischargers on the front and back of the vehicle, wire cutters, a strengthened front bumper with extra storage capacity, covered engine air intakes and a manually operated searchlight.

The Canadian Army deployed a squadron of 20 Leopard A6Ms to Afghanistan between September and December 2007 and these were followed by a troop of three Danish Army Leopard 2A5DKs. Denmark's Hxrens Operative Kommando (Army Operations Command) published a press release describing the action of its Leopard 2 in support of British-Danish operation in January: «With a great deal of machine gun fire and 20 rounds fired from the guns, the Danish Leopard tank crews engaged the Taliban both out in open terrain and when the enemy forces took cover in compounds. Tank fire, which is frighteningly accurate, penetrates walls but usually does not level a mud-brick compound the way large bombs dropped by aircraft can.»

In the same manner Canadian Leopards have smashed through the outer walls of compounds and used their main guns to blow 'mouse holes' to allow infantry to enter buildings. Speaking at the US Army Armor Conference in May 2008 Canadian armour officers stressed that the use of the tank reduced reliance on close air support and artillery thus reducing collateral damage.

In September 2006 the Canadian Army deployed a squadron of Leopard C2s (a Canadian Leopard 1A5) to Afghanistan fitted with Mexas armour around the front of the hull and turret to protect against IEDs and RPGs. Lessons from Afghanistan influenced the army to reverse an earlier decision to replace its 30-year old Leopard C2s with the Stryker Mobile Gun System, and in early 2007 Canada negotiated the lease of 20 Leopard 2 A6M tanks from German Army stocks and purchased 80 Leopard 2 A4s and 20 support variants from the Netherlands. To improve protection against mines the Leopard 2 A6M features added floor plates, blast-resistant crew seats and revised ammunition stowage. Krauss-Maffei Wegmann also developed a 'slat' or 'bar' armour package to protect the sides and rear of the Canadian tanks from RPGs fired at close quarters. One of the Canadian Leopard 2A6M Can tanks was extensively damaged by an IED strike in November with one crewmember injured.

Reflecting the evolving nature of Taliban operations, the Canadian Leopards are now used to provide direct fire support 'in extremis', a quick reaction force, route clearance, deterrence and deception. To reflect these roles the armour squadron, as of March 2008, consisted of two Leopards 2 A6Ms and a Leopard C2 with dozer blade in squadron

headquarters, three troops each of four Leopards 2 A6Ms, three Leopard C2s fitted with mine rollers and three Leopard C2s fitted with mine ploughs.
At Eurosatory 2006 Krauss-Maffei Wegmann unveiled the Leopard 2 Peace Support Operations (PSO) tank, a company-funded prototype of a Leopard 2A6 optimised for operations in an urban environment. Advanced passive armour side skirts have been mounted along the hull sides and additional armour has been added to the sides and roof of the turret. To minimise the exposure of the crew the machine gun on the commander's cupola has been replaced by a remote controlled weapon station that can be armed with a 7.62-mm or 12.7mm machine gun or a 40-mm automatic grenade launcher. The tank's optics are protected against damage from falling debris and thrown stones. A dozer blade is fitted to the front of the hull enabling the tank to clear barricades and rubble. Rheinmetall has developed its own modernisation package for the Leopard 2. One element designed to provide 360° situational awareness is the Azev (Automatische Zielerfassung and Verfolgung) which consists of two or four CCD camera modules, each providing 180° coverage.
The German Army is reducing its tank fleet to 125 Leopard 2 A5s and 225 A6s, including 70 2A6M models. In addition, the service plans to retain 50 Leopard 2A4 turrets modified for urban operations which will be fitted to Leopard 2 A5/A6 chassis as required. The service is expected to order a prototype for evaluation in 2009. Other members of the 'Leopard 2 club' - which expanded to 18 members earlier this year with the Portuguese purchase of 37 used Leopard A4s from the Netherlands - will be watching these trials with interest.
A key element of any urban operations package will be new multi-purpose ammunition. To complement its DM53 and DM63 kinetic energy anti-tank rounds Rheinmetall Waffe Munition also produces a 120mm High-Explosive Anti-Tank-Multipurpose round. The company is developing a new HE round to engage soft and semi-hard targets. It features a fuse that can be set with or without delay; the tank's fire control system sets the time delay of the fuze.
The French Army has placed an initial order for 1000 units of Nexter's new High Explosive-Tracer Mk II round which can be used against buildings and bunkers as well as light and medium armoured vehicles. Nexter is evaluating a time fuze to enable the round to be detonated above dug-in targets. Nexter is developing the Polynege top-attack projectile which is intended to 'defeat various kinds of targets (main battle tanks, light armoured vehicles, dismounted troops, infrastructures) beyond the line of sight up to a distance of eight km'. Under DGA contracts Nexter conducted a demonstration flight in 2007 and is preparing to demonstrate the terminal-attack stage of the system.
Israeli Merkava tanks carry the Israel Military Industries 120mm Anti-Personnel/Anti-Materiel (Apam) round, which is designed to defeat dismounted infantry, light armoured vehicles, 50cm of double reinforced concrete, bunkers of sand and timber construction and hovering helicopters.
According to IMI the primary threat that the APAM deals with is anti-tank squads equipped with extremely lethal AT weapons. These squads, spread out massively in the modern battlefield, on the ground, in vehicles, in buildings and bunkers and have become a major threat to today's tanks.
The Apam flies on an overhead attack trajectory to dispense six submunitions which shower lethal fragments over a zone 50 metres long and 20 metres wide. To attack bunkers the Apam is fired as a unitary round. The US Army is evaluating the Apam, under the US designation XM329, for use by Ml tanks. IMI also offers a 105-mm Apam round.
General Dynamics Ordnance and Tactical Systems produces the M1028 120mm canister round for use by US Army and US Marine Corps M1A1 and M1A2 tanks and the M1040 105-mm round fired by the Stryker Mobile Gun System.
Ardec initiated the project followed a request from US Forces in Korea in 1999 for a round that could be used against dismounted ATGW teams. The round dispenses approximately 1100 tungsten balls as soon as it clears the muzzle and is also effective against normal block walls, concertina wire and cars. The round was chosen as one of the army's top ten inventions in 2004 and was fielded in Iraq the following year.
Ardec is developing the 120mm XM1069 Line-of-sight Multipurpose (Los-MP) munition to defeat hardened targets and enemy personnel through the employment of a multi-mode programmable base detonating fuze and blast fragmenting target penetrating warhead. The Los-MP round is intended to replace the M830 Heat, the M830A1 High Explosive Anti-Tank Multi-Purpose Tracer, the M908 High- Explosive Obstacle Reduction Tracer and the M1028 rounds, thus offering significant tactical and logistics advantages and hopefully lower acquisition costs. Developmental rounds have been tested against double reinforced concrete walls, earth and timber bunkers, anti-personnel targets and a T55 tank. The round is being developed as part of the Future Combat System programme for use by the Mounted Combat System planned to enter service from 2015. The army has expedited development to meet current operational needs and the Los-MP could be fielded as soon as 2010.

Long-range Sniper

The Lockheed Martin MLRS has recently made the transition from a Cold War saturation weapon designed to 'clear grid squares' to a '60 km sniper' thanks to the introduction of new precision-guided munitions.
The XM30 GMLRS was developed under a 48-month System Development and Demonstration (SDD) contact awarded in November 1998 to Lockheed Martin, partnered with Diehl, MBDA and Fiat Avio. Using the Extended Range-MLRS as a basis the consortium integrated an inertial measurement unit and a global positioning system into the rocket, along with canards in the nose, enabling the GMLRS rocket to deliver a warhead to within a five-metre circular error of probability beyond 70 km. Low-rate initial production for the US Army of the M30 GMLRS equipped with a cargo warhead carrying 404 M85 Dual Purpose Improved Conventional Munitions began in mid-2003. A point-strike capability

is provided by the M31 GMLRS Unitary, which features an 89kg high-explosive fragmentation war-head developed by General Dynamics Ordnance and Tactical Systems under subcontract to Lockheed Martin. A new tri-mode fuze that can be programmed for airburst, point-impact and delay detonation is under development. The weapon debuted in combat on 9 September 2005 when eight GMLRS Unitary Urgent Materiel Release rockets fitted with an interim point-detonation/delay fuze destroyed two insurgent strongholds more than 50 km away.
The army's FY09 budget request states, «In the more than 500 missions flown in Operation Iraqi Freedom/Operation Enduring Freedom, the GMLRS Unitary Rocket has recorded a 98% reliability rate demonstrating high effectiveness and low collateral damage while supporting troops in contact».
The British Army became the first European customer for the GMLRS when it placed a $ 55 million order in mid-2005 for rockets equipped with unitary warheads.
In July 2006 Lockheed Martin conducted the first test of a unitary Enhanced Blast Warhead that is now in development.

AVIATION LEADERS DISCUSS UAV ACCESS TO COMMERCIAL AIRSPACE
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Europe's military and civil aviation authorities are reviewing a new industrial and regulatory plan to certify military unmanned aerial vehicles (UAVs) to fly through commercial airspace as early as 2013, writes Brooks Tigner. The air-insertion capability will enable long-endurance UAVs to deploy safety across Europe's skies for expeditionary purposes.
Consultative stakeholders include NATO, national defence and Interior ministries, international civil-aviation authorities and Eurocontrol (the pan-European air-navigation authority). However, the plan's success will depend on development of more than a dozen critical technologies and an investment of hundreds of millions of euros.
«We now have a technology roadmap for getting to air insertion,» an EU military official told Jane's. «There's a huge amount of development and standardisation work coming down the pipeline for Industry, research institutes, regulators and EU policy makers. The stakes are high and it's a big gamble, but we can't stand by and do nothing if we want to have a viable UAV market for Europe in the future.'
The plan was largely instigated by the EU's European Defence Agency (EDA) and the European Commission, with the former identifying the requirements and technologies common to both military and civil UAVs, the latter analysing the industrial, research and regulatory challenges.
In 2007, the EDA commissioned a small EUR500,000 (USD787,000) study from industry to map Europe's existing capabilities and user expectations regarding the technological and regulatory steps required to achieve air insertion. The study, known as Air4All, was carried out by a new consortium of Europe's biggest UAV players: Alenia Aeronautics; BAE Systems; Dassault Aviation; Diehl BGT Defence; EADS CASA; EADS Defence & Security Germany; Selex Galileo; QinetiQ; Rheinmetall Defence Electronics; Saab AB; Sagem Defence Systems; and Thales. Results were presented to stakeholders during a 24 June meeting at Eurocontrol's headquarters. The study outlines 14 technology capabilities that must be achieved to safely allow self-guided UAVs to move across Europe's commercial airspace.
These Include capabilities such asp sense-and-avoid, and ground obstacle avoidance; autonomous behaviour and emergency recovery; secure command and control (C2) and bandwidth for C2 and payloads; advanced man-machine interfaces; all-weather detection; and automatic take-off and landing.
One of the first of the 14 mile-stones will be to develop, test and certify sense-and-avoid technologies. This will be done by five EDA nations - France, Germany, Italy, Spain, Sweden - via a new project known as MIDCAS (Midair Collision Avoidance System for UAVs). Worth around EUR50 million, the four-year project was approved in mid-June and should be launched later this year, with the EDA providing project oversight.
An interesting feature of the project is its two-tiered structure for intellectual property rights (IPR). One IPR category will cover understanding gleaned from the project that can be freely distributed among all air-insertion stake-holders, while another will pertain to technology and understanding reserved for the project's industrial partners only.

BAE SYSTEMS INTEGRATES FORWARD-LOOKING SONAR ON TALISMAN UUV
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BAE Systems Integrated System Technologies (Insyte) is completing integration of a Reson SeaBat 7123 triple-frequency forward-looking sonar aboard its Talisman M unmanned underwater vehicle (UUV) ahead of at-sea trials, writes Richard Scott.
Talisman has been developed by BAE Systems, through its Maritime Autonomy Group, as a mission-reconfigurable UUV able to perform a range of maritime missions. Recent trials and demonstration activity in the United States and the UK has largely focused on the UUV's ability to autonomously perform remote end-to-end mine localisation, recognition and disposal.

BAE Systems has previously demonstrated Talisman M with a GeoAcoustics GeoSwath Plus 500 kHz wide-swath side-scan sonar. SeaBat 7123, however, will provide the vehicle with a forward-looking capability for the first time.
Operating at three frequencies, SeaBat 7123 is a high-resolution sonar designed to reliably detect and classify mine-like objects at long ranges and in difficult environments. According to Reson, the low frequency (110 kHz) mode provides for long-range detection of mine-like objects; the medium frequency (240 kHz) mode is typically used for primary detection in shallow waters and high-reverberation environments; and the high-frequency (455 kHz) mode provides high-resolution shadow classification data for mine classification.
'Snippets' of processed sonar data will be relayed from Talisman to a shore control station, initially via a WiFi link. Further downstream, BAE Systems is looking to use a high-data rate Inmarsat BGAN satellite link.
The transducer assembly associated with SeaBat 7123 is mounted external to the vehicle chassis, with the sonar electronics carried internally. Reson and BAE Systems are sharing the costs of integration and testing.

IAI PLANS NAVAL ROTARY-WING UAV
By Rupert Pengelley
Jane's International Defence Review, UK
www.idr.janes.com
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An Israeli remotely piloted helicopter project made its European debut in model form on the Israel Aerospace Industries (IAI) stand at Eurosatory 2008 in June. The MALAT division of IAI said that it is «currently manufacturing a naval rotary unmanned air vehicle [NRUAV] based upon a conversion of a commercial helicopter» which, to judge from the model on display, is the Alouette III helicopter, known as Chetak in Indian Navy service.
The NRUAV is designed to operate from combat ships with displacements of 600 tons or greater in support of surface warfare and is intended either as a replacement for, or as a complement to, existing helicopters or maritime patrol unmanned aerial vehicles (UAVs) and aircraft.
Shipboard elements of the NRUAV consist of command-and-control stations integrated into the ship's combat information centre and the ship's existing hangar, traversing and securing systems. The mission equipment payload (MEP) includes an IAI Elta multi-mode radar with both surface-search and air-to-air modes (the latter helping to extend platform air-defence capability), plus a synthetic aperture radar mode for overland and littoral operations support. Additionally, according to IAI, it will be able to carry a Tamam MOSP optronics sensor, «ELINT and/or SIGINT systems, a COMINT sensor, and additional equipment as defined by the user».
The ship and MEP segments are common to those already operational aboard IAI's Heron and Searcher fixed-wing UAVs. All three platforms and their payloads can be operated from identical ground segments. The strap-on remote-control systems are designed to be applied aboard ship, ensuring the helicopter can be operated in manned condition if need be. With a payload of 200 kg at maximum fuel weight (internal fuel only), it is estimated a pilot-less Chetak should be able to stay on station 50 n miles from the ship for four hours, or for six hours with a 150 kg payload.

ON CALL: HONING WEAPON EFFECTS FOR THE CLOSE AIR SUPPORT ROLE
Robert Hewson reviews the key weapons used in the CAS role today along with some of those emerging for the future
Jane's International Defence Review, UK
www.idr.janes.com
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It has often been said that the fighting in Afghanistan and Iraq in recent years has forced Western militaries to relearn some old lessons, particularly regarding close air support (CAS).
However, modern air forces are very well provisioned for the role. Indeed, the sophistication of targeting systems and general weapons accuracy have never been so great and innovations, such as satellite guidance, multimode seekers, networked weapons, datalinks and geolocation, have all proven directly relevant to the CAS mission.
CAS platforms have also moved on from the classic image of a fighter bomber. The range and speed of a modern strategic bomber enable it to stay overhead for hours, striking several widely separated and often fleeting targets in one afternoon.
Accordingly, modern CAS is conducted not just by traditional tactical aircraft but also by what were once strategic assets - B-1Bs and B-52Hs - carrying targeting pods and datalinks, while at the same time, unmanned aerial systems such as the MQ-1 Predator or MQ-9 Reaper are operated strategically.
Communication systems such as L-3's ROVER and other video datalinks have completely changed the terms of reference for CAS. The days of the traditional 'nine-line brief' tasking orders are numbered now that everyone in the targeting loop can see the same things at the same time.
The greatest problem for the CAS mission, particularly for today's dominant urban CAS requirements, is the issue of weapons effects. Put simply, too many of today's precision weapons are too big to use. What was once thought of as a small bomb - the standard 500 lb (227 kg) Mk 82 and equivalent - is now overmatched to many current targets.
This has spurred the development of lower collateral damage CAS weapons, but much work remains to be done in this

area. Not until the emerging technology of 'dial-a-yield' conventional weapons and exotic reactive materials is perfected and deployed will commanders have full freedom of action on the urban CAS battlefield.
The rate of change and improvement for current weapon designs remains steady, and often impressive. This is particularly true of the grandfather of modern precision munitions, the Paveway laser-guided bomb (LGB) - still the mainstay of current CAS missions.
Raytheon is the custodian of the original Paveway programme, although it has now been joined by Lockheed Martin as a second source of production. Nevertheless, while US Paveway production is split between the two companies, Raytheon completely dominates the export market. The Paveway LGB family is large and varied, and split between two basic systems, of which Paveway II weapons are the most common. They carry a modest price tag but suffer from their 'bang-bang' guidance (the control fins move with full deflection from stop to stop, with no intermediate settings) which can make them less accurate. The more modern Paveway III system has sophisticated proportional guidance, an improved semi-active laser seeker, and the ability to be released at high speeds and low level, though it is commensurately more expensive. For Western CAS missions, the preferred weapons are almost always 500 lb GBU-12 Paveway II or perhaps the 1,000 lb GBU-16 Paveway II, the heavyweight 2,000 lb GBU-10 Paveway II being restricted to large infrastructure targets.
Earlier this decade Raytheon introduced a significantly improved weapon, the dual-mode Enhanced Paveway. All Enhanced Paveways combine the well-proven laser seeker with a new GPS-aided inertial navigation system (INS) to give an all-weather precision capability unaffected by smoke or clouds. Development of the Enhanced Paveway was driven largely by the UK, which fielded it in a unique configuration for British 1,000 lb Paveway IIs. The US followed suit with specialist penetrator versions of the Paveway III (EGBU-24 and EGBU-28). Within the last few years Raytheon has fully modified its entire Paveway family for dua-mode guidance and has attracted an increasing number of export sales. Current Paveway II variants include the 1,000 lb GBU-48 (EGBU-16), 500 lb GBU-49 (EGBU-12) and the 2,000 lb EGBU-50 (EGBU-10).
Alongside the Paveway, Boeing's JDAM (Joint Direct Attack Munition) has become another CAS weapon of choice. More than 195,000 JDAMs have been delivered to the US Air Force (USAF) and Navy (USN), and there are 19 international customers for the weapon. JDAM production is progressing at high rates and low cost. The assembly line at St Charles Missouri is staffed by only a limited number of people, but is turning out 60 JDAMs a day - or one every seven minutes.
As with the Paveway, a JDAM 'kit' is not a finished weapon. The basic JDAM incorporates a GPS-aided INS that is strapped on to a wide range of standard 'dumb' warheads. These include the 2,000 lb Mk 84 general-purpose (GP) bomb and the BLU-109 penetrator (GBU-31 JDAM), the 1,000 lb Mk 83/BLU-110 GP bomb (GBU-32 JDAM) and the 500 lb Mk 82/BLU-111 GP bomb (GBU-38 JDAM).

Lighter Options

The advent of the relatively lightweight GBU-38 variant in 2003-04 changed significantly the way JDAMs could be employed. The 500 lb weapons can be carried in multiples by tactical fighters and so the GBU-38 series is in widespread USAF and USN use. In 2007 the USN introduced the GBU-38(V)4/B JDAM, which incorporates the new BLU-126/B warhead, specially devel-oped for urban CAS. The BLU-126/B is a low collateral damage warhead with about 85 per cent of the high-explosive (HE) load of a Mk 82 GP bomb removed, and replaced with inert glass beads. Only 27 lb of HE remains. The first bomb was dropped in combat (in Iraq) on 27 July 2007, by a Marine Corps F/A-18 Hornet.
Another new development is the Laser JDAM (UDAM - GBU-54/B), which transforms the bomb into a dual-mode weapon. The GBU-54/B has man-in-the-loop guidance and is largely intended to deal with moving targets. During tests the system has proved its ability to hit vehicles moving in excess of 70 mph. The UDAM's DSU-38/B laser seeker is supplied by EFW, based in Dallas-Fort Worth, and it has the same form and fit characteristics as the standard DSU-33/B radar proximity fuze (supplied by ATK), which is fitted to regular JDAMs. Work on the LJDAM began in 2005 to meet an urgent requirement. In May 2007 600 GBU-54/Bs were ordered for the USAF (400) and USN (200) and by June 2008 60 weapons had been delivered to the USAF.
Boeing is working on yet another guidance enhancement to the JDAM, this time adding an RF seeker to produce an all-weather weapon for use against moving targets. The 'Radar JDAM' will be fitted with a millimetre-wave seeker. Boeing is hoping to receive formal US Department of Defense (DoD) Joint Capability Technology Demonstration (JCTD) funding to move ahead with full development. Boeing is also building the GBU-39/B Small Diameter Bomb (SDB), packaging the accuracy and effectiveness of a much larger JDAM in a 250 lb weapon that can be carried internally by an F-35 or F-22. Al-ready wellsuited to the urban CAS mission, a specialised low collateral damage warhead is being developed for the SDB. The FLM (Focused Lethality Munition) has a new carbon-fibre casing with an advanced multi-phased explosive fill that delivers a concentrated explosive effect with little fragmentation. Work on the FLM began in 2006; its warhead is being developed by the Lawrence Livermore National Laboratory and the USAF Research Laboratory.
In Europe the development of CAS-suitable weapons has been slow. Only France produced indigenous LGBs, but the resultant BGL (Bombe Guidée Laser) family of weapons - developed by Matra and now the responsibility of MBDA - was thwarted by high costs and limited platform integration. The deployed BGL weapons were all 1,000 lb (BGL 400) and 2,000 lb class (BGL 1000) bombs and so not best-suited to the CAS mission.

Smaller Bombs

France recognised the need to move to smaller bombs at an early stage, and supplanted its BGL inventory with Raytheon Paveway IIs and IIIs - including the little-known 500 lb GBU-22 Paveway III. France has also become an

enthusiastic purchaser of the Enhanced Paveway II weapon, putting the EGBU-12 into service last year on upgraded French Navy Super Etendard SEMs. EGBU-12 integration is now under way for French Air Force Mirage 2000Ds, to be ready by early 2009.
Standing out among current European weapons programmes is SAGEM's AASM (Armement Air-Sol Modulaire, modular air-to-surface weapon). Conceived as an affordable PGM, the AASM allows autonomous GPS/INS-guided attacks with the option of more accurate man-in-the-loop terminal guidance thanks to a staring array imaging infrared (IR) seeker. The modular AASM kit adds a new guidance/seeker assembly to existing bombs, along with pop-out airfoils to increase gliding range. A rocket booster further extends its stand-off capability. As such, in some ways the AASM is 'over speced' for the simple CAS mission but it provides the essential combination of precision with a smaller (500 lb class) warhead. The AASM is intended for use against point targets (replacing the AS 30L laser-guided missile in French service) and has demonstrated its ability to be retargeted in flight. During a February 2008 test an AASM with its IR-seeker fitted was launched by a Mirage 2000 against a GPS impact point, which had been deliberately shifted several hundred metres away from the precise target. Real-time seeker data was used to correct the impact point.

AASMs in Combat

The first combat use of an AASM came in April 2008 when two were dropped by a French Air Force Rafale over Afghanistan. The Rafale, under the direction of a Canadian forward air controller, was supporting troops in contact and was operating in a mixed formation with a laser designator-equipped Mirage 2000D. The GPS-guided AASM was used when bad weather stopped the Mirage from dropping Paveways.
In May 2008 Sagem and MBDA announced a teaming agreement over the AASM. MBDA will now lead all sales and marketing efforts for the weapon and the two companies will cooperate in the development of future variants. This deal adds a significant new product to the MBDA portfolio and bodes well for future AASM sales. The AASM is one of the few modern precision weapons that can be sourced from outside the US. By contrast, the UK has never matched France's achievements with airborne weapons. For many years there were no UK CAS weapons beyond GP and cluster bombs, rockets and a UK version of the Paveway It guidance kit for Britain's vintage bomb shapes. However, the UK was instrumental in the push to develop the dual-mode Enhanced Paveway design and is now fielding a next-generation precision munition of its own in the shape of Raytheon's Paveway IV. Even more recently MBDA has developed a secretive laser-guided Brimstone missile to meet an urgent operational requirement (UOR) for a CAS weapon and Thales has revealed its Lightweight Multi-role Missile (LMM) project which has some relevance to the CAS mission.
The UK Royal Air Force's (RAF's) Paveway IV - produced by Raytheon Systems to fulfil the precision-guided bomb (PGB) requirement of 2001 - is close to entering service after several delays in its development. It arose from the RAF's experience during the 1999 Kosovo conflict, when combat was hampered by bad weather and the lack of sufficient, suitable PGMs.
The significance of the dual-mode Paveway IV for the UK is in its size. Based on the Mk 82 warhead shape, with improved penetrating capabilities, the Paveway IV gives the UK a smaller (500 lb) precision weapon option for the first time. The RAF's existing 1,000 lb precision weapons are almost always too big to use in CAS missions (particularly urban CAS). This situation led to a short-lived flirtation with inert concrete-filled bombs as a CAS weapon of last resort. Work on the Paveway IV started in 2003 but progress was slowed by several problems, the most serious of which was the failure of the bomb's Thales, Aurora 'smart' fuze during 2007 testing. This forced a 12-month delay while the fuze was redesigned and the bomb requalified. With that testing under way it is now hoped that Paveway IV deliveries can begin by the end of 2008. As an interim weapon Raytheon speedily developed a modified version of the RAF's existing 1,000 lb Paveway It, the dual-mode Paveway II Plus, using the guidance section of the Paveway IV.

Laser-Guided Brimstone

Another current UOR has produced the laser-guided Brimstone, developed by MBDA from the radar-guided Brimstone anti-armour weapon. Designed to defeat massed ranks of Soviet armour the Brimstone has proved to be unusable on the modern battlefield in its intended role. Its millimeter-wave radar seeker does not have sufficient discrimination to be launched in its 'fire and forget' mode in a theatre filled with civilian vehicles. To try to retrieve some value from its stock of inventory weapons the UK Ministry of Defence (MoD) initiated a modification programme to fit them with a semi-active laser seeker.
A similar laser Brimstone proposal (the Brimstone II) was first postulated by Boeing in 2006, but was dropped due to a lack of interest from any US customer. Now the concept has been resurrected by the RAF. The missile is being integrated with the Tornado GRA almost certainly aimed for deployment in Afghanistan when the Tornado force replaces the Harrier there later in 2009.
In June 2008 Thales unveiled its Light-LMM. Derived from the laser-beam riding Starstreak air-defence missile, the LMM is being offered as an unmanned aerial vehicle (UAV) CAS weapon. BAE Systems has revealed an armed version of its Herti UAV fitted with the LMM, known as Fury, while Austria's Schiebel has also demonstrated an LMM for its S100 rotary UAV.
There are several precision missile systems in service around the world that are key CAS weapons. Perhaps the most widespread is Raytheon's AGM-65 Maverick. In 2007 production of the laser-guided AGM-65E missile variants was

restarted, 12 years after the last weapon was built. Originally acquired by the USN and Marine Corps (USMC), the USAF now needs the missile to meet an urgent air-to-surface weapons requirement. The RAF too was forced to rapidly acquire AGM-65F2 weapons (with imaging IR seekers) to give a precision attack capability to the Harrier GR.7 for the 2003 invasion of Iraq.
Today the USAF finds itself targeting insurgent fighters in Iraq laying improvised explosive devices (IEDs) to ambush US troops. The insurgents often travel in fast-moving vehicles but the high-speed tracker in the laser Maverick is able to maintain a lock regardless. Now the USAF intends to modify some of its existing Mavericks with the latest laser seeker - and has already taken a small stock of missiles from the USN to use in combat. It is not unusual to see US fighters (typically F-16s or F/A-18s) operating in Iraq carrying mixed loads of Paveways or JDAMs under one wing, matched with an AGM-65 on the opposite side.
Another weapon in almost daily use is the AGM-114 Hellfire. Developed for helicopter use, and once tied to a handful of platforms (chiefly Boeing's AH-64 Apache and Bell's OH-58D Kiowa Warrior) the Hellfire has now become the primary UAV weapon thanks to its small size and weight Hellfires are the sole weapon for the MQ-1 Predator and the primary weapon for the MQ-9 Reaper, which can also carry 500 lb Paveways. The lethality of the original HE anti-tank warhead on the baseline AGM-114K variants was soon found to be less than impressive when fired against buildings or targets in the open. Relying on a jet of molten metal to cut through tank armour the missile could slice through the front of a building and out the other side, often leaving the occupants relatively unscathed and still shooting back. The blast/ fragmentation warhead of the AGM-114M was also found to be lacking in destructive power when used against larger infrastructure targets.

Thermobaric Explosives

However, when the USMC went to war in Iraq in 2003 it was able to bring the hith-erto completely unknown AGM-114N with it - the thermobaric (TB) Hellfire. The Marines led the development of TB explosives in the US and by late 2001 the Indian Head weapons facility had begun work on new TB weapons. The intent was to produce a weapon capable of destroying, for example, six rooms inside a building over a penetration range of 60 ft (18 m). It was decided to adopt the Hellfire, and replace its PBX-109 explosive fill with a new TB compound, PBX N-12. Two AGM-114Ns had been successfully fired before the invasion of Iraq and a development batch of 60 missiles was rebuilt from existing AGM-114Ks.
During the course of the war about 10 or 15 AGM-114Ns were used. One Marine AH-1W Cobra helicopter crewmember recalled, «there was sniper fire coming from a building, a big building. We shot it and the damn thing just collapsed». The pilot who fired the first AGM-114N in combat noted, «most of the targets we hit demanded a blast/fragmentation warhead because they were buildings or structures of some kind - unconventional Hellfire targets, but what we found was that if you fired a Hellfire at a brick or clay building you could see something happen inside, but we wanted to take the whole thing down. Rockets and TOW had pretty much the same effect, so we really needed the AGM-114N».
The term 'thermobaric' was hastily dropped once the AGM-114N became public. Instead it is referred to as the Metal Augmented Charge (MAC) warhead. Since 2003 the AGM-114N has entered full production, further improvements have been made to the AGM-114M and even the AGM-114K has been given an enhanced blast/ fragmentation effect from a UK effort to develop a tantalum sleeve for the warhead. The UK has acquired the AGM-114N Hellfire to equip Army Air Corps WAH-64D Apache Longbows, and perhaps also the RAF's MQ-9 Reapers.
Both the Maverick and the Hellfire are scheduled for replacement by a new multi-purpose weapon, the Joint Air to Ground Missile (JAGM). The JAGM replaces the previous Joint Common Missile (JCM) effort, which was being developed by Lockheed Martin until it was cancelled by US spending cuts. As with the (essentially identical) JCM programme, the aim for the JAGM is to equip helicopters and fast-jets with a common, modular weapon (in a single configuration) that can defeat all battlefield targets.

JAGM Technology

In May 2008 two competing teams of Lockheed Martin and Boeing/Raytheon submitted their bids for the JAGM technology demonstration phase which will be put on contract later in 2008. One design will be chosen to forward to a system design and development (SDD) phase and then production. The in-service date for the selected JAGM weapon is set at 2016. Given the chequered history of the JCM and the leisurely schedule set out for the repeat attempt it is still not clear if the JAGM is a secure programme.
The major existing alternative to the Hellfire is Rafael's series of Spike missiles. Developed in Israel as the NT family (Neged Tank, anti-tank) three variants were initially produced under the codenames Gill, Spike and Dandy (NT-G, NT-S, NT-D). In 2002 Rafael gathered all these weapons under the Spike banner. The original Spike (now known as Spike-LR) was the first helicopter-launched variation. This was followed by the larger Dandy (now known as Spike-ER) which had an 8,000 m range (similar to Hellfire).
Each of these missiles use an innovative, and so far unique, man-in-the-loop guidance system. After launch, a fibre-optic cable connecting the missile to the launch platform relays seeker imagery back to the operator, who can see exactly where the missile is going and correct its course accordingly. This makes the Spike a highly accurate weapon, more so than any laser-guided missile. The Spike also has an auto-tracking fire-and-forget capability. The combination of these two different control modes make it exceedingly precise. The Spike has been integrated on Israel's Cobras and is now being adopted by Spain to equip its Eurocopter Tigers.

Several initiatives are under way to deliver laser-guided precision rocket systems. In the US the 'on-again off-again' Advanced Precision Kill Weapons system (APKWS) programme was abandoned (for a second time) by the army but is now continuing as a navy initiative. BAE Systems is primed with General Dynamics to build a new variant of the 70 mm (2.75 in) Hydra 70 rocket fitted with a semi-active laser seeker.
Rival privately funded programmes are also under way at Lockheed Martin (DAGR - Directional Attack Guided Rocket) and at Raytheon where the company has teamed with the United Arab Emirates to develop guided airborne rocket systems.
Other manufacturers such as Turkey's Roketsan, Belgium's FZ, Norway's Nammo and Canada's Magellan Aerospace (makers of the CRV7) have all embarked on similar guided-rocket projects.
There is a place for aircraft guns in CAS. The RAF is clearing the BK 27 cannon on its Eurofighter Typhoon FGR.4s for ground strafing, specifically to give the new fighters an essential air-to-surface option for when they are finally deployed as ground-attack assets.
The use of fighter aircraft guns to attack ground targets has reached unprecedented levels during US operations over Iraq and Afghanistan, to say nothing of combat helicopter action.
At the other end of the scale Air Force Special Operations Command (AFSOC) is refitting and upgrading its heavily tasked AC-130 gunship fleet, replacing the dated Bofors gun and inadequate 25 mm GAU-12 with two 30 mm Mk 44 Bushmaster cannons. The AFSOC is also behind the push for revolutionary new laser weapons for the gunship role.
Boeing is developing the Advanced Tactical Laser (ATL), which is fitted to a C-130H Hercules testbed and which holds out the promise of devastating speed-of-light fire power. The ATL chemical laser is aimed and fired through a rotating turret that extends from the C-130's belly. In May 2008 Boeing fired the installed laser for the first time.
Lasers are championed by many as the ultimate game-changing weapons. When they are finally ready for use, their capabilities will be astonishing - but that day is still a long way off with the possible exception of the YAL-1 Airborne Laser ballistic missile defence system. Solid-state lasers still need to make a leap to the true kilowatt range and then into the megawatt class before they are effective weapons.

SEA AND HYDROID TEST NEW SWATHPIUS SONAR
Jane's International Defence Review, UK
www.idr.janes.com
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UK-based systems engineering group SEA and US autonomous underwater vehicle manufacturer Hydroid have completed initial at-sea demonstrations of SEA's SWATHplus-RS100 high-resolution bathymetry and sidescan sonar aboard Hydroid's manportable REMUS 100 unmanned underwater vehicle (UUV), writes Richard Scott.
Purpose-designed for the REMUS 100 vehicle, SWATHplus-RS100 is a 468 kHz sonar, providing accurate bathymetric survey with colocated sidescan over a wide swath width. It has been designed to provide high-resolution two- and three-dimensional imaging for hydrographic survey, navigational charting, environmental monitoring, wreck location and other applications.
SEA has worked with Hydroid's own engineers to interface and integrate SWATHplus-RS100 with REMUS 100. The sensor, featuring 1-3 composite transducer technology, fits as a short section of the UUV (380 mm length) and will be available as a fit from build or as an upgrade for existing vehicles.
According to SEA, the SWATH-plus-RS100 has a swath width of up to 15 times the vehicle altitude (maximum 75 m) to a maximum of 200 m swath width (less than 160 degrees swath width equivalent). Coverage density is over 150 samples per metre at a maximum update rate of up to 30 Hz. Resolution across track (best case) is quoted as 3 cm. The system can be interfaced to the Kearfott T-16 inertial measurement unit (IMU) for high-accuracy survey. It can also operate without an IMU, albeit at lower accuracies.
SEA added that SWATH-plus-RS100 interfaces to a high-performance PC, running Microsoft Windows XP or Windows Vista, using a 10OBase T Ethernet interface. All mission data is stored on board.
The first in-water trials of SWATH-plus-RS100 integrated with REMUS 100 were performed in the UK in March 2008. Follow-on testing in the Netherlands is scheduled for late June.

PRESS RELEASE

Germany - 5 MQ-9 Unmanned Aerial Vehicle Aircraft
US Defense Security Cooperation Agency, Washington, USA
August 1, 2008

The Defense Security Cooperation Agency notified Congress of a possible Foreign Military Sale to Germany of five MQ-9 Unmanned Aerial Vehicle Aircraft as well as associated equipment and services. The total value, if all options are exercised, could be as high as $205 million.
The Government of Germany has requested a possible sale of 5 MQ-9 Unmanned Aerial Vehicles (UAV), 4 Mobile Ground Control Stations, one year of maintenance support, engineering support, test equipment, ground support, operational flight test support, communications equipment, technical assistance, personnel training/equipment, spare

and repair parts, and other related elements of logistics support. The estimated cost is $205 million.
Germany is a major political and economic power in NATO and the Atlantic and a key democratic partner of the United States in ensuring peace and stability in this region and around the world.
Germany requests these capabilities to provide for the defense of deployed troops, regional security, and interoperability with the United States. This program will increase Germany's ability to contribute to future NATO, coalition, and anti-terrorism operations that the U.S. may undertake. Germany is a staunch supporter of the Global War on Terror and has over 3,000 military participating in coalition operations in Afghanistan with the U.S. By acquiring this capability, Germany will be able to provide the same level of protection for its own forces as those of the United States.

PRESS RELEASE

Italy - 4 MQ-9 Unmanned Aerial Vehicle Aircraft
US Defense Security Cooperation Agency, Washington, USA
August 1, 2008

The Defense Security Cooperation Agency notified Congress of a possible Foreign Military Sale to Italy of four MQ-9 Unmanned Aerial Vehicle Aircraft as well as associated equipment and services. The total value, if all options are exercised, could be as high as $330 million.
The Government of Italy has requested a possible sale of 4 MQ-9 Unmanned Aerial Vehicles (UAV), 3 Mobile Ground Control Stations, five years of maintenance support, engineering support, test equipment, ground support, operational flight test support, communications equipment, technical assistance, personnel training/equipment, spare and repair parts, and other related elements of logistics support. The estimated cost is $330 million.
Italy is a major political and economic power in NATO and the Atlantic and a key democratic partner of the United States in ensuring peace and stability around the world. Italy requests these capabilities to provide for the defense of deployed troops, regional security, and interoperability with the United States. This program will increase Italy's ability to contribute to future NATO, coalition, and anti-terrorism operations that the U.S. may undertake. By acquiring this capability, Italy will be able to provide the same level of protection for its own forces as those of the United States.

SURVEIL THIS! DAHLGREN DRONE ON DISPLAY - MILITARY AIR AND SPACE MUSEUM EXHIBITS NEW HIGH-TECH EYE IN THE SKY WANT TO GO?
Dahlgren engineering showcased in exhibit at National Air and Space Museum
By Rusty Dennen
Fredericksburg, VA., USA
www.fredericksburg.com
August 1, 2008

Much of the engineering work at the Naval Support Facility at Dahlgren is buried in technical reports or classified and out of public view. But one recent project at the base's Naval Surface Warfare Center is on display for everyone to see at the National Air and Space Museum in Washington. The exhibit on military unmanned aerial vehicles opened in April and features Dragon Eye, the first of a new generation of small, lightweight reconnaissance planes.
The high-tech drone with a 3-foot wingspan, sophisticated guidance system and cameras in its nose and side was developed at the King George County base's research and development lab. First used during Operation Iraqi Freedom in 2003 for intelligence briefs, it also has flown surveillance missions for the Marines in Afghanistan.
«Dragon Eye has been tremendously successful for the [Marines] and represents a very early fielding of a an unmanned aerial vehicle» before they came into widespread use, Pete Lilly, head of the unmanned systems integration branch at NSWC, said in a news release.
Brent Azzarelli and Ron Colbow, both NSWC scientists and engineers, and Steven Mattos, a retired Marine colonel and senior research scientist at Old Dominion University, developed the system. Colbow said the team, «guided Dragon Eye through design, production, fielding - an opportunity not all engineers get to experience these days.»
The project was funded by the Office of Naval Research. The Marine Corps Warfighting Laboratory in Quantico was also involved. Dragon Eye's main mission is to allow battlefield commanders to «see» across the next hill or behind buildings to assess enemy numbers and positions so troops don't have to.
Weighing in at about six pounds, the AeroVironment Dragon Eye RQ-14A has two propellers powered by a virtually silent electric motor. Because of its small size, the craft is nearly invisible on enemy radar. It can fly up to 35 mph at altitudes up to 1,000 feet for about 6 miles. It is assembled and launched by a two-person team in about 10 minutes. A hand-held computer does flight planning, monitoring and storage of real time, high-resolution color or infrared video images. The plane - made of fiberglass and Kevlar - can be flown manually or fully automatic from a wireless modem on a ground station, using Global Positioning Satellite coordinates. It is launched by a bungee cord or by hand. Nearly all the components are off the shelf and easily replaced. One estimate put production costs at about $60,000 to $70,000 for each kit.
The National Air and Space Museum display features a Dragon Eye used by the Marines, with its control unit, laptop and operator video goggles. Dik Daso, curator of modern military aircraft at the National Air and Space Museum, said

the Dragon Eye is «simple, compact and is easily understood by younger kids, particularly those who build and operate powered model planes.»

UND TO TEAM WITH TECHNOLOGY COMPANIES ON $50 MILLION UAS CONTRACT
By Kevin Bonham
Grand Forks Herald, USA
August 1, 2008

The University of North Dakota's (UND) Unmanned Aircraft Systems Center of Excellence will begin training pilots for the Predator unmanned aerial vehicle being used by the Air Force and Air National Guard in surveillance and armed reconnaissance in wartime Iraq and Afghanistan. Under the $50 million Air Force contract, UND will work with a team of global defense and aviation technology companies on the project. The private sector partners are Crew Training International, Science Applications International Corp., XVionics and BGI-LLC. The training program will begin Oct. 1.
In addition, UND will launch a four-year degree program in 2009 for students who want careers in UAS fields, according to Al Palmer, director of flight operations at UND's John D. Odegard School of Aerospace Sciences. Palmer credits UND's expertise in flight training as being key to being part of the new multi-year contract. «North Dakota has a lot of the pieces of the puzzle for UAS,» he said. «This contract is just icing on the cake.»
Gov. John Hoeven announced the contract award Thursday. «This demonstrates that the UND Center of Excellence for UAVs is truly world class, and an emerging leader in this exciting field,» the governor said. «The award speaks volumes about UND's UAS Center of Excellence and establishes a partnership with the Air Force and private sector defense companies.»
Unmanned Aircraft Systems, as they are now called, represent one of the most effective intelligence gathering and counterterrorism weapons. They are credited, in large measure, with counteracting Improvised Explosive Devices used by the enemy in Iraq and Afghanistan to kill and wound U.S. and allied ground forces. With their long on-station time, sophisticated sensors and guided munitions, «drones» can monitor urban areas and secure major supply routes much more effectively than manned aircraft.
Under the contract, employees of the participating private-sector companies, UND students and graduate students will train at UND on simulation training systems. Students who graduate from the new four-year UAS program will have a world of career opportunities, from Air Force, Air National Guard and Department of Homeland Security UAS pilots, to business and industry.
The North Dakota Air National Guard is piloting U.S. military Predator drones in the Middle East from a base in Fargo. Grand Forks Air Force Base is expected to host the Predator, beginning in 2009. «It's kind of an exploding industry out there with unmanned aircraft systems. There are so many possibilities,» he said. «Maybe FedEx will use them to carry cargo. «It's like airplanes were in 1917. If somebody had asked then, what are you going to do with all those airplanes? Well, we've seen what has happened.»
The UAS Center of Excellence draws researchers from across UND's campus, including Aerospace Sciences, the School of Engineering and Mines, the Northern Plains Center for Behavioral Research and the Center for Innovation. UND is working with the Federal Aviation Administration to create one of three centers for UAS test and evaluation within the United States.
The UAS Center of Excellence provides 50 high-value industry jobs. The state has invested $2.5 million into the UAS program, which has been matched by $7.2 million in private-sector funds. The Center employs 23 people at a $1.7 million total payroll. «Our No. 1 goal is integration of the UAS into the NAS,» Palmer said. NAS refers to National Air Space, or public air space. UAS is used only in restricted or military air space. Private sector partners for the UAS Center of Excellence include: AAI/Aerosonde, American Crystal Sugar Company, Appareo Systems, Boeing, Cirrus Design, Composite Engineering, Diamond Aircraft, Frasca International, General Atomics, General Dynamics, Hamilton Sundstrand, Ideal Aerosmith, Killdeer Mountain Manufacturing, LaserLith Corp., Lockheed Martin, Mayo Clinic, Microsoft, Micro Systems Technology, Northrop Grumman, Raytheon, Science Application Int'l Corporation, SEO Precision and Alion.
Highlights of the Center's work to date include:
- Laserlith Corp., based in Berkeley, Calif., has established a presence in Grand Forks because of the UAS Center. Laserlith is projecting the creation of as many as 100 manufacturing jobs.
- High-tech prototype systems created at the Center have been tested and flown on Lockheed Martin's Sky Spirit UAS and Raytheon's Cobra UAS.
- UAS representatives have presented at 11 national and international conferences on UAS industry development.
- The United States Air Force Battle Lab funded a $3.76 million contract to the UAS Center at UND to research the potential of using gang phased array radar to measure the UAS sense and avoid issue.

PRESS RELEASE

Elbit to Equip Australia With Additional Skylark I UAVs
Elbit Systems Ltd., Haifa, Israel
August 3, 2008

Elbit Systems Ltd. announced today that it was awarded yet another contract to supply the Australian Army with more Skylark(R) I UAV systems for an estimated value of several million dollars. This is the Australian Department of Defence's

third Skylark(R) order, following the initial order for the Australian Army in 2005.
Haim Kellerman, Executive Vice President and General Manager of Elbit Systems UAS Division said, «Australia's decision to equip its Army with an additional set of Skylark(R) I UAV systems underscores recognition of the UAV systems' capabilities and added value to soldiers in active war zones.»
The Skylark(R) I, advanced mini-UAV system, is a unique man-pack configuration designed for day and night observation and data collection «beyond the hill» up to distances of 10-15 km. The mini-UAV system is equipped with an exceptionally quiet electric motor, totally autonomous flight and outstanding observation capabilities allowing for easy operation and orientation. The system can be launched by soldiers after a brief training period. The Skylark(R) I system enhances ground forces' tactical performance in various mission scenarios.

CHINESE AVIATION MERGER MAY PORTEND MILITARY APPLICATIONS
By Wendell Minnick
Defense News, USA
www.defensenews.com
August 4, 2008

Plans by China's aerospace industry to merge two state-owned aviation mega-corporations officially are intended to create an indigenous manufacturing capability for large passenger airliners to fill domestic orders and compete on the international market. But not everyone is satisfied the merger is for such innocuous reasons, and see strategic thought behind it.
China's defense needs are expanding and becoming more advanced. Increasingly, rhetoric out of Beijing suggests China views the Pacific as a large Chinese pond. Plans include the development of advanced fighters and bombers, along with a stealthy unmanned combat aerial vehicle, the Mian (Dark Sword). Access to advanced Western commercial aviation technology can rapidly migrate to assist military goals.
«One official purpose of the merger is to facilitate production of new commercial passenger aircraft. I seem to recall that the Luftwaffe used a similar program to develop bombers,» said Thomas Kane, author of «Chinese Grand Strategy and Maritime Power.»
The process to merge China Aviation Industry Corp. I and II (AVIC 1/11) began in June and is expected to be finalized soon. Though European and U.S. arms sales are restricted by embargoes put in place after the 1989 Tiananmen Square massacre, commercial deals have mushroomed over the past 10 years.
Recent deals, particularly during the Farnborough Air Show in the United Kingdom, demonstrate foreign commercial aerospace companies are working closely with Chinese aviation companies.
During the recent show, AVIC I and Bombardier Aerospace announced a cooperative agreement in the commercial aircraft market, allowing Bombardier's participation in the development of the ARJ21-900 aircraft.
Other deals included Boeing sign-ing a $63 billion order with Air China for 15 777-300ER and 30 Next-Generation 737-800 jetliners. In June 2007, Boeing signed a $500 million deal with four AVIC I and II subsidiaries to manufacture parts for the 747 and the 787 Dreamliner.
Sikorsky created the Shanghai Sikorsky Aircraft Co. as a joint venture with Shanghai Little Eagle Science and Technology Co. in' March 2003. The company is now manufacturing the S-76 helicopter in a joint venture between Shanghai Sikorsky and AVIC II.
Originally, AVIC was one consortium of aerospace companies spread across China. However, in July 1999, the corporation was split, retaining its original name, in an attempt to streamline and modernize its manufacturing capabilities and competitiveness.
AVIC I centered on larger and more complex aircraft, including upgrades and new variants of the Xian H-6 (Tu-16) medium-range bomber and JH-7 fighter-bomber, as well as newer Chengdu J-10 and FC-1 fighters.
AVIC II centered on smaller aircraft, including military fixed-wing trainers and helicopters. Helicopters include the Changhe WZ-10 attack helicopter, Z-8 heavy transport helicopter and Z-11 light utility helicopter.
China's *Xian* H-6 (Tu-16) «Badger medium-range bomber meets the Air Force's immediate needs with new variants still being un-veiled. But projecting force beyond China's borders will require a new, strategic long-range bomber capability in the next 20 years.
With a service life of 40 years, the H-6 is expected to continue in operation until at least 2020, but China is the only country in the world still using the Tu-16 and is beginning to look beyond its borders to secure oil and other resources in Africa, the Middle East and South America.
China has also struggled to upgrade its fighter arsenal to fourth generation and acquire heavy fixed-winged transports and aerial tankers. The love affair that once existed between China and Russia appears over, and orders for new Russian aircraft have shriveled up over the past 10 years.
Instead, China's aerospace industry has been building a closer relationship with European and U.S. aviation manufacturers. The result could produce unexpected benefits for China's military.
«China, like Britain, has an established tradition of adapting civilian hardware to military purposes,» Kane said. «So, if the AVIC merger works as planned, it has the potential to build up China's force projection capabilities.
«If the merger and joint ventures with foreign corporations make the new AVIC more profitable, that will ultimately feed back into military capacity as well,» Kane said.
Improvements in China's commercial aerospace industry will quickly equate to better military aircraft. Larry Wortzel,

chairman of the U.S.-China Economic and Security Review Commission, said the greatest improvements are coming from the exposure of AVIC personnel to U.S. quality control techniques, improved systems engineering and advanced research-and-development skills, which will no doubt give China's Air Force a much-needed boost.
«Other areas that will probably be improved are the ability to work with and develop composite materials and to integrate *fly-by*-wire systems and avionics,» said Wortzel, who served as a U.S. Army attaché in China.
He sees no way to stop U.S. commercial aerospace unintentionally influencing the military, but he recommends that the Pentagon «watch what Chinese engineers and technicians» are doing in the United States. «Also, we have to keep way ahead in developing new systems and counter-measures,» Wortzel said.

REPORT: PIONEERS NEEDED TO BOOST EUROPEAN DEFENSE
By Pierre Tran
Defense News, USA
www.defensenews.com
August 4, 2008

Political leaders serious about owning the military means to intervene in foreign crises must form «pioneer groups» if the 27-nation European Union is to break out of institutional paralysis, said a report from think tank European Council for Foreign Relations.
The adoption of such specialist groups is one of several recommendations made in the report, «Reenergizing Europe's Security and Defence Policy,» by Nick Witney, senior policy fellow at the council and former head of the European Defense Agency (EDA).
Pioneer groups allow a multi-speed Europe to develop, ensuring that some capitals do not hold back others that want to spend money on arms in order to deploy EU forces for peacekeeping or more aggressive «peacemaking» operations.
The report spells out what Witney galls the «grotesque waste» of most of the taxpayers' 200 billion euros ($315 billion) spent on defense in Europe. Much spending is duplicated, and goes on equipment and troops maintained on Cold War lines. Meanwhile, sending a force to Chad's border with Darfur is, in part, held up for want of helicopters.
«Ten years after the launch of the EU's defense effort at a Franco-British summit in St. Malo, the European Security and Defense Policy badly needs a shot in the arm,» the report said. «Procrastination, weak coordination and persistent absenteism by some member states have hobbled the union's ability to tackle the real threats to its citizens' security and to make a contribution to maintaining international peace.»
Money needs to be spent differently, it says. «Europeans badly need to reduce their numbers in uniform and shift resources into equipment and research spending.»
The figure of investment per soldier is an imperfect but important indicator. Britain and Sweden lead by a long measure, respectively 79,386 euros and 65,027, followed by France and the Netherlands, and in a third group Finland, Germany and Spain.
Arguing stabilization operations need «boots on the ground» does not justify high headcounts, the report says, as only 30 percent of troops can operate beyond national frontiers. «What the other 70 percent do with their days is a mystery,» the report notes.
In the absence of the EU Lisbon ' reaty, which offered a «permanent structured cooperation,» government leaders should apply the pioneer approach to the EDA, allowing a self-selecting group of countries to pursue military modernization.
To qualify as a pioneer, a country should spend at least 1 percent of gross domestic product on defense, with a minimum 1 percent of military manpower deployable on operations. In the former group, Ireland, Luxembourg and Malta would be excluded; in the latter, Bulgaria, Cyprus, Greece and Malta would fail the test.
Specialist pioneer groups should be set up, determined by minimum spending levels in national defense budgets on capability development, research and technology, and armaments.
Among pioneers, a core group should be made up of those which spend most in a given area.
«Little progress in a Europe of 27 will be possible if each member state feels entitled to block the closer cooperation of others,» the report said.
It said that in order to turn the union into an effective military player, defense ministers must:
- Demand urgent action on key capability gaps. «It is time to stop the analysis and to agree concrete plans for fixing the most glaring deficiencies.»
- Insist that staffs give real priority to pooling resources and sharing capabilities.
- Use the EDA. Ministers should insist on dialogue between agency and national planners, allowing the EDA to challenge priorities and act as matchmaker for national efforts. Britain should drop its veto on EDA staff recruitment.
- Convene summit meetings of industrial leaders to push for defense consolidation. Here, the report draws on the U.S. model of the 1993 «last supper» called by Defense Secretary Les Aspin, who urged 15 business CEOs to consolidate or liquidate.

As well, the report says heads of state and government should push defense ministers toward fundamental defense reviews and ear-mark a proportion of national budgets to be spent in common with European partners - or handed back to the Finance Ministry.
On the operational front, the report points up the EU's «corporate amnesia» in which there is a resistance to learning from the weaknesses of past operations and to apply lessons to the next. These include «the spectacularly amateurish

improvisation of the early days, such as financing the operation in Aceh [the tsunami-wracked area of Indonesia] on the personal credit cards of the advance party.»
The report argues that a more systematic and professional approach is needed. EU leaders should:.

- Develop explicit strategies for interventions, based on coherent and prioritized regional approaches.
- Increase the pool of units on standby, particularly assets in short supply such as helicopters, medics and logisticians.
- Create a corps of civilian reservists (EuroAid) such as police and government experts.
- Compensate defense budgets of countries taking part in operations through a common funding and fairer arrangements for handling unbudgeted costs. The Athena scheme was adopted in 2004 but has only applied to less than 10 percent of extra costs of EU operations.
- Establish in Brussels an integrated civilian/military operational headquarters for command of European Security and Defense Policy operations, except for the larger missions run with *NATO help.* Set up a hand-picked lessons-learned unit with direct access to ministers to tell the truth about how operations have gone and what needs fixing.

France's presidency of the EU has made defense a priority, looking to update the European Security Strategy. That opens an opportunity for political leaders and publics to debate security and defense, the report said.
Among the conclusions: «Only an iron political will underpinned by a clear sense of direction can make the strategic case prevail over the near-term inconvenience.»
Yves Boyer, deputy director of think-tank Fondation pour la Recherche Stratégique, said the pioneer principle had merit. «This is a really good idea, but the question is who is going to launch initiative?» he said. «Which of the European leaders is going to take lead?» Certainly not British Prime Minister Gordon Brown, who is politically weak, Boyer said. German Chancellor Angela Merkel has other priorities and French President Nicolas Sarkozy has to cope with uncertainty following rejection of the EU Lisbon treaty. «There is no enthusiasm, no will,» Boyer said. There is a measure of defense cooperation with the common airlift command based in the Netherlands, he said.

CONTRACT SUPPORTS DEVELOPMENT OF UAV TEST PROCEDURES
Space War, USA
www.spacewar.com
August 4, 2008

The Georgia Tech Research Institute (GTRI) has won a contract to support development of a roadmap designed to improve the testing and evaluation of unmanned and autonomous systems for the U.S. Office of the Secretary of Defense (OSD).
«The field of unmanned and autonomous systems is evolving rapidly, and new techniques are needed to effectively test and evaluate the capabilities that are being inserted into these systems. This is especially challenging for systems that are increasing in levels of autonomy,» said Lora Weiss, a GTRI principal research engineer.
«Our task is to develop a roadmap that identifies new approaches to testing autonomous systems and details what needs to be tested, how the autonomous technologies can be tested, and when the testing needs to occur.»
Known as the Roadmap Development and Technology Insertion Plan (RD-TIP), the one-year $430,000 award is funded through the U.S. Army at White Sands Missile Range. The initiative is headed by Derrick Hinton, T and E/S and T program manager with the Test Resources Management Center in the U.S. Department of Defense.
«Many new technologies are being developed for unmanned and autonomous systems that must be tested and evaluated before they can be deployed. New approaches are needed for testing and measuring the robustness of these systems, especially in non-deterministic and evolving environments,» Weiss noted.
«The only way to know how to test them is to understand both the details of the technology and the system that it is going into. GTRI has extensive experience in both areas and can uniquely couple fundamental research with warfighter systems.»
The effort will address all five major unmanned and autonomous systems domains, including systems that operate in the air, on the ground, underwater, on the sea surface and in space. The roadmap will address both vehicles and the socio-technical environments in which they operate.
«There is a strong desire from the warfighter to get these systems into the field,» Weiss added. «This, coupled with the rapid pace at which unmanned and autonomous systems are developing, creates a need to consider new options for more flexible testing of unmanned systems. Through this roadmap, the government has asked us to help define these options.»
Test and evaluation has traditionally been a focus area for GTRI, noted Rusty Roberts, a principal research engineer who oversees all of GTRI's test and evaluation programs. «The current roadmap award builds on GTRI's long-term experience with test and evaluation for government customers and couples it with GTRI's strong knowledge of unmanned systems,» he said.
The unmanned systems test and evaluation project is a new area within the Test and Evaluation Science and Technology Program, which is sponsored by the Test Resource Management Center (TRMC) within the Office of the Secretary of Defense.
GTRI has ongoing projects in four areas of the T and E Science and Technology Program: unmanned and autonomous systems, directed energy, net-centric systems and non-intrusive instrumentation.
The applied research arm of the Georgia Institute of Technology, GTRI is also involved in other test and evaluation

projects for the government, Roberts said.
Its test and evaluation capabilities cover a broad range of engineering and scientific disciplines, including tracking new technologies and their effect on test and evaluation, planning and executing programs for the government's operational test agencies and providing and/or sponsoring test and evaluation professional education courses and workshops, as well as meetings such the annual ITEA Technology Conference.
Unmanned and autonomous systems are recognized as critical components to all aspects of modern warfare across the joint forces, and they are growing in mission effectiveness. They have proved effective in Afghanistan and Iraq by providing commanders at both the operational and tactical levels with improved intelligence, surveillance, reconnaissance, and precision strike capabilities.
«They are being chosen over manned systems when the situation involves the dull (long mission times), the dirty (sampling for hazardous materials) and the dangerous (lethal exposure to hostile action) - and when the unmanned systems can provide capabilities that are not achievable by manned systems,» Weiss noted.

SPY PLANE INTELLIGENCE 'LACKING'
The effectiveness of unmanned aerial vehicles used by UK military in Iraq and Afghanistan is being undermined by skills shortages, MPs have warned.
BBC News, UK
http://news.bbc.co.uk
August 4, 2008

The said the reconnaissance drones have «battle-winning» properties, but how the intelligence they gather is processed needs to be improved. The Ministry of Defence had been «slow» to appreciate their potential, the Commons Defence Committee report added. The government said it «recognised» the contribution UAVs made.
UK forces currently use three types of unmanned aerial vehicles (UAVs) - the American-made Reaper, the Hermes 450 and the Desert Hawk. The Reaper - of which the UK owns two after a third crashed in Afghanistan - is operated remotely via a satellite link by an operator based in Nevada in the US. It is used to detect snipers or insurgents and roadside bombs, which have become one of the biggest threats to forces on operations in Iraq and Afghanistan. It is also one of the UK's main tools in hunting down Taleban or al-Qaeda operatives. The less powerful Hermes 450 and Desert Hawk are both operated in the field.
According to the report, the Army had a 48% shortfall in UAV operators at the start of 2008, while the RAF was 18% shy of the number needed to assess the intelligence value of images. The committee said that the Ministry of Defence had been «slow» to appreciate their potential and had had to buy in UAVs as a «stop-gap filler» while it awaited the delivery of its new Watchkeeper system in 2010. «The MoD must address the manning deficits in these areas in order to gain the maximum value from its current and future UAV systems,» the committee said.
It also warned that the MoD needed to improve the way the material gathered by the UAVs was processed and disseminated to commanders on the ground, with one major computer programme already experiencing delays.
«The MoD was perhaps slow to appreciate the potential of UAVs, but now recognises the important contribution that they can make,» said committee chairman James Arbuthnot. «The MoD must push forward with its planned improvements so that out Armed Forces can continue to achieve information superiority over the enemy.»
Armed Forces Minister Bob Ainsworth said UAVs had proved to be an «invaluable asset» for the military. «They have a crucial role to play in future operations and we will continue to invest in them,» he said.

GERMANY DENIES PENTAGON UAV CLAIM
Agence France-Presse, Defense News, USA
www.defensenews.com
August 5, 2008

BERLIN - Germany on Aug. 5 denied a Pentagon report that its military was seeking to buy new armed drones that the United States recently began flying in Iraq and Afghanistan. «There are no plans to purchase a fighter drone for the Bundeswehr,» a spokesman for the defense ministry in Berlin said.
In notifications to Congress, the Defense Security Cooperation Agency said Aug. 4 that Germany requested a possible purchase of five of the unmanned combat aircraft while Italy was seeking four. Both countries wanted the new drones «for the defense of deployed troops, regional security and interoperability with the United States,» the agency said.
Known as a hunter-killer drone, the Reaper can carry four Hellfire missiles and two 500-pound laser guided bombs, and remain aloft tracking a target for long periods of time. A sale to Germany, with one year of maintenance support, was estimated to be worth 205 million dollars (132 million euros). Germany has more than 3,000 troops in Afghanistan. «By acquiring this capability, Germany will be able to provide the same level of protection for its own forces as those of the United States,» the agency said.

SPY PLANES COULD BE USED IN THIS COUNTRY
Public Servant Daily, UK
www.publicservice.co.uk
August 6, 2008

Unmanned aerial vehicles (UAVs) could be patrolling UK skies to aid the police and security services.
The Ministry of Defence (MoD) is said to be carrying out research and development to enable the spy planes, which hold highly sophisticated monitoring and photography equipment, to be rolled out in the next three years.
If the idea, called the ASTRAEA programme, is approved by ministers, it would make the UK the first country to use UAVs to monitor its own citizens. The Israeli military operates them over Palestinian cities such as Gaza and Ramallah, while the US Customs and Border Protection agency flies them over the Mexican border to detect illegal migrants along specified routes.
Gareth Crossman, director of policy at the civil rights watchdog Liberty, said: «The question is not so much about the technology but what one does with it. We have quite definite laws about where CCTV can be used but of course with UAVs you have much greater ability to gather material in private spaces and this would lead to concern. «If they are used to simply hover to gain random information then that would obviously be a matter of worry and a civil liberty issue.»
UAVs are currently restricted to military installations in Salisbury Plain because of regulations banning them from using the same airspace as civil aircraft. However, a commercial consortium led by BAE Systems will provide the safety measures necessary for the planes to fly over the UK within three years.
The Defence Committee has released a report which offers support for the idea but has criticised the MoD for being just an observer and not an active member of the project. «In the response to our report we expect the MoD to set out why it supports the Astraea programme only in an 'observer role' and its future plans with regard to this programme,» the committee said.
Robert Emerson, a security analyst who specialises in deciphering aerial images, said: «Satellite images can be affected by clouds and lack of light, with UAVs you can avoid that by choosing the height at which you fly. There is now also Google Earth, but these are often old images out of date. There is tremendous potential in material gathered by UAVs. «There will obviously be implications for privacy, human rights, etc. That is something the government will have to address and I imagine that there will be protests from some quarters. But you certainly cannot blame police and intelligence services for wanting to use them.»

MILITARY USE OF ROBOTS INCREASES
Science Daily, USA
www.sciencedaily.com
(Adapted from materials provided by Washington University in St. Louis.)
August 5, 2008

War casualties are typically kept behind tightly closed doors, but one company keeps the mangled pieces of its first casualty on display. This is no ordinary soldier, though - it is Packbot from the iRobot Corporation.
Robots in the military are no longer the stuff of science fiction. They have left the movie screen and entered the battlefield. Washington University in St. Louis's Doug Few and Bill Smart are on the cutting edge of this new wave of technology. Few and Smart report that the military goal is to have approximately 30% of the Army comprised of robotic forces by approximately 2020. Of course, they aren't envisioning robotic soldiers from movies like «Star Wars» and «I, Robot.»
«When the military says 'robot' they mean everything from self-driving trucks up to what you would conventionally think of as a robot. You would more accurately call them autonomous systems rather than robots,» says Smart assistant professor of computer science and engineering.
All of the Army's robotic force is tele-operated, meaning there is someone operating the robot from a remote location, perhaps often with a joystick and a computer screen. While this may seem like a caveat in plans to add robots to the military, it is actually very important to keep humans involved in the robotic operations.
«It's a chain of command thing. You don't want to give autonomy to a weapons delivery system. You want to have a human hit the button,» says Smart. «You don't want the robot to make the wrong decision. You want to have a human to make all of the important decisions.»

Not like the Terminator

While movies display robots as intelligent beings, Smart and Few aren't necessarily looking for intelligent decision-making in their robots. Instead, they are working to develop an improved, «intelligent» functioning of the robot.
«It's oftentimes like the difference between the adverb and noun. You can act intelligently or you can be intelligent. I'm much more interested in the adverb for my robots,» says Few. Few, who is Smart's Ph.D. student, is also interested in the delicate relationship between robot and human. He is working to develop a system in which the robot can carry out a task while keeping a human in the loop and with the ability to create new goals for the robot. Few says that there are many issues that may require «a graceful intervention» by humans and these need to be thought of from the ground up.

Meet George Jetson

«When I envision the future of robots, I always think of the Jetsons,» says Few. «George Jetson never sat down at a computer to task Rosie to clean the house. Somehow, they had this local exchange of information. So what we've been working on is how we can use the local environment rather than a computer as a tasking medium to the robot.»
To work toward this goal, Few has incorporated what many would simply consider a toy into robotic programming. Using a Wii controller, Few capitalizes on natural human movements to communicate with the robot. Using something as simple and as common as this video game controller also has added benefits in a military setting. Rather than carting around a heavy laptop and being forced to focus on a joystick and screen, soldiers in battle can stay alert and engaged in their surroundings while performing operations with the robot.
«We forget that when we're controlling robots in the lab it's really pretty safe and no one's trying to kill us,» says Smart. «But if you are in a war zone and you're hunched over a laptop, that's not a good place to be. You want to be able to use your eyes in one place and use your hand to control the robot without tying up all of your attention.»
Robots are already finding a place among deployed troops. There are unmanned aerial vehicles and ground robots for explosives detection. Robotics advancements do, however, raise new ethical questions, such as where to place the blame if a robot kills someone. Nevertheless, as the technology progresses, more robots are being sent into battle first. The mangled Packbot on display at iRobot is just one such example of a fortunate casualty.
«When I stood there and looked at that Packbot, I realized that if that robot hadn't been there, it would have been some kid,» reflects Few.

TODAY'S NEWS FOR THE LAST FRONTIER
By Kathleen McCoy
Anchorage Daily News, USA
www.adn.com
August 5, 2008

The Alaska Journal of Commerce reports that the oil company will try out unmanned aerial vehicles to spot marine mammals in the Beaufort Sea. Ten unmanned flights are planned in August and September, accompanied by a manned De Havilland Twin Otter with trained marine mammal observers aboard. Results from both types of surveillance will be compared.
The spy-type unmanned aircraft costs $100,000 and will fly from a research vessel stationed offshore from Prudhoe Bay. The flights will target 12 inflatable kayaks meant to simulate whales. Information from these flights will be used to verify whether unmanned surveys will be an accepted method of meeting and monitoring mitigation requirements issued by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service.

UK MOD GIVES INITIAL APPROVAL FOR ISTAR REVAMP
By Tom Ripley and Tony Skinner
Jane's Defence Weekly, UK
www.defensenews.com
August 6, 2008

A major five-year revamp of UK intelligence, surveillance, targeting and reconnaissance (ISTAR) capabilities has received initial approval from the UK Ministry of Defence (MoD).
Senior UK procurement chiefs approved the initial business case for Project Dabinett earlier this year and an industry day was held at the end of June to brief potential participants on business opportunities in the GBP840 million (USD1.7 billion) programme.
Jane's understands the budget for Project Dabinett has also been endorsed in the ministry's Planning Round 08 spending review, highlighting the importance placed on improving the ISTAR capabilities of the UK armed forces by the MoD.Dabinett is the result of a two-year development and analysis study run by the Defence Equipment & Support (DE&S) organisation's Director General ISTAR Future Business Group and the MoD's Director Equipment Capability (DEC) ISTAR branch, assisted by defence technology company QinetiQ and consultant LogicaCMG. The project was described at the industry day as «DEC ISTAR's highest priority».
Under the new Dabinett concept five tranches of work will be launched to improve UK ISTAR capabilities in the near term, with a focus on enhancing support to current operations in Iraq and Afghanistan. These include improvements to ISTAR processes, enhanced information sharing, better ISTAR management, improved analysis and collaboration, as well as the fielding of a new generation of deep and persistent ISTAR collection assets. The aim is to join up all the UK's existing and future air, land and sea ISTAR capabilities into a coherent end-to-end system.
Sources close to the project say that only a third of the budget will be used to develop new deep and persistent unmanned aerial vehicles (UAVs), with the remainder - some GBP500 million - being used to provide horizontal linkages between what are termed 'legacy' and 'future legacy' ISTAR collection systems and networks.
MoD sources say most of the UK's existing ISTAR systems are still «stovepipes», citing systems such as the Raytheon Sentinel R.1 airborne stand-off radar (ASTOR), which is to enter service later this year but as yet lacks gateways to link in with other UK ISTAR and situational awareness sensors.

Funding to launch Dabinett has been drawn from several other ISTAR budget lines, such as Project Helix, which sought to replace the Royal Air Force's Hawker Siddeley Nimrod R.1 electronic intelligence (ELINT) gathering aircraft, and the Shaman naval communications electronic support measures system. «Dabinett is now the only pot of new ISTAR money in the UK,» said an industry executive familiar with the project. Dabinett also appears to have been approved at the expense of the Project Listener network connection capability - cancelled in the current MoD planning round - which aimed to automate data sharing between collector platforms.
In evidence to the House of Commons Defence Committee in May, General Dynamics UK (GDUK) questioned the priority given to programmes aimed at integrating ISTAR platforms and systems, given the project's cancellation. «Starkly, it is no use collecting data without the means to fuse it into a timely and coherent picture so that decision-makers can act upon it,» said the GDUK memorandum. «This is a key tenet of NEC [network enabled capabil-ity]. Fusion/NEC appears to be an ISTAR capability gap. With the cancellation of [Project] Listener, which would have done it for airborne EW [electronic warfare], one has to question whether the MoD is giving fusion/NEC sufficient priority.»

US MARINE CORPS PREPARES TO STAND UP THIRD UAV SQUADRON
By Gareth Jennings
Jane's Defence Weekly, UK
www.defensenews.com
August 6, 2008

The US Marine Corps (USMC) has announced that it is on course to stand up its third unmanned aerial vehicle (UAV) squadron on 12 September. Unmanned Aerial Squadron (VMU) 3 will be based at the Marine Corps Air Ground Combat Center (MCAGCC) at Twenty-nine Palms in California and is being created to provide additional reconnaissance capability as well as assisting in the training of ground units.
According to a USMC spokes-person. VMU-3 will rotate during training and on deployment with VMU-2, which is also based at MCAGCC, and VMU-1, which operates out of Marine Corps Air Station (MCAS) Cherry Point in North Carolina. VMU-3 will be primarily equipped with the AAI Corporation RQ-B7 Shadow 200 unmanned aerial system (UAS). In preparation for the squadron's forthcoming activation, 50 marines from the 200 that will eventually make up VMU-3 have already arrived at MCAGCC.
The Shadow 200 is a non-autonomous UAV that has accumulated more than 325,000 flight hours on deployment to both Iraq and Afghanistan with the USMC and US Army. The single propeller-driven aircraft is 3.41 m long and has a wing-span of 3.89 m. With a service ceiling of 15,000 ft and an operational radius of 49 n miles, the RQ-B7 is capable of operating for up to 5 hours 30 minutes for the purpose of providing a near real-time surveillance and target-acquisition capability to troops on the ground.

PRESS RELEASE

Boeing and Teammates Test SWIR Camera on ScanEagle
Boeing, St. Louis, USA
August 6, 2008

The Boeing Company, Goodrich Corporation and Insitu Inc. have successfully flight-tested a ScanEagle unmanned aircraft equipped for the first time with a short-wave infrared (SWIR) camera.
The camera, built by Goodrich's Sensors Unlimited Inc. unit, enables ScanEagle operators to see objects more clearly in fog, rain or when little or no heat is radiated. During recent tests at the Fort Leonard Wood test range in Missouri, the camera recorded clear, streaming video during daytime, twilight and nighttime operations. The Boeing-led team, which integrated the camera in less than 14 weeks, plans additional flight tests later this year.
«The idea for the SWIR camera arose to meet our customers' growing maritime intelligence, surveillance and reconnaissance (ISR) needs,» said Don Iverson, Boeing ScanEagle Naval Programs manager. «The SWIR camera is particularly useful when there is fog or rain and conventional electro-optical and long-wave infrared cameras are severely limited.»

MQ-9 REAPER: THE FIRST OPERATIONAL UCAV?
Defense Industry Daily, USA
www.defenseindustrydaily.com
August 7, 2008

The MQ-9 Reaper, once called «Predator B,» is somewhat similar to the Predator. Until you look at the tail. Or its size. Or its weapons. It's called «Reaper» for a reason - while it packs the same surveillance gear, it's much more of a hunter-killer design. The Reaper is 36 feet long, with a 66 foot wingspan. Its maximum gross takeoff weight is a whopping 10,500 pounds, carrying up to 4,000 pounds of fuel, 850 pounds of internal/ sensor payload, and another 3,000 pounds on its wings. Its 6 pylons can carry GPS-guided JDAM family bombs, Paveway laser-guided bombs, Sidewinder missiles for air-air self defense, and other MIL STD 1760 compatible weapons, in addition to the Hellfire anti-armor missiles carried by the Predator. When loaded up with laser-guided Hydra rockets, the Reaper becomes the equivalent of a close air support fighter with less situational awareness, lower speed, and less survivability if seen - but much, much longer

on-station time. Some have called it the first fielded Unmanned Combat Air Vehicle (UCAV).
That capability set makes the MQ-9 considerably more expensive than its MQ-1 Predator counterparts, whose price also benefits from volume production orders. Given these high-end capabilities, and high end expenses, one might not have expected the MQ-9 to enjoy export success that matches its famous cousin's. Nevertheless, that's what appears to be happening. MQ-9 operators currently include the USA and Britain, who have both used it in hunter-killer mode. If current contract requests are fulfilled, Italy and Germany will soon add MQ-9s to their forces as well.
Note that this is a new DID FOCUS article; it will shift to DII membership only after the first 2 days.

The MQ-9 Reaper, and its Little Brothers

The MQ-9 Reaper was once called «Predator B,» but it is only loosely based on the famous MQ-1 Predator drone. With Predators, Sky Warriors, and MQ-9 Reaper UAVs all headed for the skies above the conflict zone, our readers have asked us to help them tell the difference.
The MQ-1 Predator is 27 feet long, with a 55 foot wingspan. Its maximum gross takeoff weight is 2,3000 pounds, and it can carry 625 pounds of fuel, 450 pounds of internal payload (sensors), and another 300 pounds on its wings for up to 2 AGM-114 Hellfire anti-armor missiles or equivalent loads. Its service ceiling is 25,000 feet, which can keep it well above the 10,000-15,000 ceiling above which most guns are ineffective. The piston engine is a Rotax 914 turbo that runs on aviation fuel, and pushes the Predator at a slow speed of 120 KTAS. It's controlled by UHF/VHF radio signals.
The MQ-1C Sky Warrior looks a lot like the Predator, but it's a little bit bigger, can carry more weapons, and has an engine that can run on the same «heavy fuel» that fills up the Army's land vehicles. The Sky Warrior is 28 feet long, with a 56 foot wingspan. Its maximum gross takeoff weight is 3,200 pounds, carrying up to 600 pounds of fuel, 575 pounds of internal payload (sensors, plus a communications relay), and another 500 pounds on its wings. This doubles its weapon capacity to 4 AGM-114 Hellfire anti-armor missiles or equivalent loads. Its service ceiling is 29,000 feet. The piston engine is a Thielert 135hp that runs on heavy fuel or higher-grade aviation fuel, and gives it a slightly faster speed of 135 KTAS.
The USAF also has an MQ-1B Block X/ YMQ-1C project to develop a Predator system that will run on heavy fuel and carry up to 4 Hellfires; now that they've achieved a joint Predator/ Sky Warrior program, the burning question is which version of the Predator will win in the end - the former version, or the new one?
As noted earlier, the MQ-9 is far more of a fighter substitute or close-air support complementor than other UAVs. Larger than its companion MQ-1 UAVs, its reinforced wings give it far greater weapons carrying capacity of 3,000 pounds. Since most manned jet fighters aren't carrying that many precision weapons for close support missions over Iraq and Afghanistan, that limit is likely to let the MQ-9 fulfill close-air support roles in most low-intensity conflicts.
Its service ceiling is 50,000 feet unless it's fully loaded, which can make a lurking Reaper very difficult to find from the ground. That wouldn't have been useful to UAVs like the Predator, given the Hellfire missile's range. On the other hand, the ability to drop GPS and laser-guided bombs makes precision combat strikes from 50,000 feet perfectly plausible. As one might expect, The MQ-9 Reaper's default sensor package is more capable than the MQ-1 family's; it includes General Atomics' AN/APY-8 Lynx I ground-looking radar, and Raytheon's MTS-B (AN/AAS-52) surveillance and targeting turret.
The engine is a Honeywell TPE 331-10T, which pushes it along at a rather speedier clip of 240 knots. Not exactly an F-16, or even an A-10, but the extra speed does get it to the problem area more quickly when a call comes in from the troops.
General Atomics' Mariner maritime surveillance UAV and FAA-certified high-altitude Altair research UAV are both derived from the MQ-9 Reaper. So, too, is NASA's Ikhana.
With other UCAVs like the US Navy's X-47, the European nEUROn project, and Britain's Taranis all focused on the stealthy fighter replacement role, and conventional UAVs optimized for surveillance rather than strike, the MQ-9 has few competitors at the moment. On emerging competitor may be BAE's Mantis UAV, whose twin pusher-propeller design and T-tail make it look like the unmanned offspring of an A-10 «Warthog» and Argentina's IA 58 Pucara counter-insurgency aircraft.

BOEING TEAM TEST SHORT-WAVE INFRARED CAMERA ON SCANEAGLE
Space War, USA
www.spacewar.com
August 7, 2008

Boeing, Goodrich and Insitu have successfully flight-tested a ScanEagle unmanned aircraft equipped for the first time with a short-wave infrared (SWIR) camera. The camera, built by Goodrich's Sensors Unlimited Inc. unit, enables ScanEagle operators to see objects more clearly in fog, rain or when little or no heat is radiated.
During recent tests at the Fort Leonard Wood test range in Missouri, the camera recorded clear, streaming video during daytime, twilight and night-time operations. The Boeing-led team, which integrated the camera in less than 14 weeks, plans additional flight tests later this year.
«The idea for the SWIR camera arose to meet our customers' growing maritime intelligence, surveillance and reconnaissance (ISR) needs,» said Don Iverson, Boeing ScanEagle Naval Programs manager.
«The SWIR camera is particularly useful when there is fog or rain and conventional electro-optical and long-wave

infrared cameras are severely limited.»
ScanEagle, a joint effort of Boeing and Insitu, was developed as a low-cost, long-endurance autonomous unmanned aircraft air system that can provide persistent ISR as well as flexible, rapid deployment for a variety of government and civilian applications. Since 2004, ScanEagle has provided daily ISR solutions for operational forces around the world, including more than 100,000 combat flight hours with the U.S. Marine Expeditionary Force, U.S. Navy and Australian Defence Force in Iraq and Afghanistan. The Navy has logged more than 1,000 shipboard launches and recoveries.

MACKAY ANNOUNCES NEW EQUIPMENT FOR CANADA'S AFGHANISTAN TROOPS
By Jeremy Torobin
Bloomberg, Canada
www.bloomberg.com
August 7, 2008

Canadian Defence Minister Peter MacKay announced new helicopters and unmanned aerial vehicles to support the country's role in a North Atlantic Treaty Organization mission in Afghanistan. The aircraft will make the 2,500 or so Canadian troops in southern Afghanistan safer and helps meet conditions for a two- year extension of the mission, MacKay said today near Montreal in remarks carried by the Canadian Broadcasting Corp.

PRESS RELEASE

Strategic win strengthens MDA's position in the UAV surveillance market
MacDonald, Dettwiler and Associates Ltd
Richmond, British Comumbia, Canada
August 7, 2008

MacDonald, Dettwiler and Associates Ltd., a provider of essential information solutions, announced today that the Canadian Department of National Defence (DND) has awarded a contract to MDA for a long endurance unmanned aerial vehicle (UAV) surveillance solution to support the Canadian Forces in Afghanistan. The surveillance solution will be operational in Afghanistan before February 2009 for a period of two years, with an option for an additional third year. The contract also includes training for the DND air vehicle and payload operators. The initial contract is valued at $95 million CAD with the third year option valued at an additional $35 million CAD.
David Hargreaves, a vice president within MDA's Information Systems group, said: 'This contract is a major milestone in MDA's strategy to become a significant contributor in the growing Canadian and worldwide UAV surveillance market. Our leading-edge solution is compatible and interoperable with stringent NATO standards. MDA's UAV surveillance solutions are highly complementary to our existing space-based and other surveillance and intelligence capabilities.'

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CANADA BUYS U.S., RUSSIAN HELICOPTERS, UAVs
Agence France-Presse
Defense News, USA
www.defensenews.com
August 8, 2008

Canada announced the acquisition of a dozen helicopters and drones Aug. 7, for use by its troops in Afghanistan, who until now have had to use dangerous roads to get around, increasing casualties.
«For years, our Canadian forces have been in the unfortunate position of not having an option other than hitching rides with allies in order to move personnel in countries like Afghanistan. Those days are over,» said Defense Minister Peter MacKay.
The military purchased six used Chinook D model helicopters from the U.S. government for $292 million and leased six Russian-built MI-8 helicopters at a cost of $36 million annually. Its predecessor was operated extensively during the Soviet invasion of Afghanistan, mainly for bombing mujahedeen fighters.
The Canadian military also bought several small Scan Eagle unmanned aerial vehicles for use over the next nine months, and leased a Heron UAV tactical system for use thereafter, at a total cost of $109 million.
«The addition of these resources will provide greater safety and security to our troops in Afghanistan, with UAVs acting as the eyes in the skies for commanders,» said Gen. Walt Natynczyk, chief of the defense staff. «The helicopters will allow commanders the flexibility to reduce ground-based resupply convoys and more easily reach remote locations in challenging environments where they could be at risk of ambushes, land mines and improvised explosive devices.»

ELBIT TO EQUIP AUSTRALIA WITH ADDITIONAL SKYLARK I UAVs

Space War, USA
www.spacewar.com
August 8, 2008

Elbit Systems has announced that it was awarded yet another contract to supply the Australian Army with more Skylark I UAV systems for an estimated value of several million dollars. This is the Australian Department of Defence's third Skylark order, following the initial order for the Australian Army in 2005.
Haim Kellerman, Executive Vice President and General Manager of Elbit Systems UAS Division said, «Australia's decision to equip its Army with an additional set of Skylark I UAV systems underscores recognition of the UAV systems' capabilities and added value to soldiers in active war zones.»
The Skylark I, advanced mini-UAV system, is a unique man-pack configuration designed for day and night observation and data collection «beyond the hill» up to distances of 10-15 km. The mini-UAV system is equipped with an exceptionally quiet electric motor, totally autonomous flight and outstanding observation capabilities allowing for easy operation and orientation. The system can be launched by soldiers after a brief training period. The Skylark I system enhances ground forces' tactical performance in various mission scenarios.

BEIJING OLYMPICS AIR POLLUTION CONTROL EFFORTS BEING ASSESSED

By Daniel Leblanc
Science Daily, USA
www.theglobeandmail.com
August 8, 2008

As the Summer Olympics in Beijing kicks off tomorrow, the event is affording scientists at Scripps Institution of Oceanography, UC San Diego, a once-in-a-lifetime opportunity to observe how the atmosphere responds when a heavily populated region substantially curbs everyday industrial emissions.
The National Science Foundation-funded Cheju ABC Plume-Monsoon Experiment (CAPMEX) will include a series of flights by specially equipped unmanned aircraft known as autonomous unmanned aerial vehicles (AUAVs) that were developed at Scripps. Instruments on the aircraft can measure smog and its effects on meteorological conditions. Data-gathering flights of the aircraft will originate at the South Korean island of Cheju, located about 1,165 kilometers (725 miles) southeast of Beijing and in the projected path of pollution plumes originating in various cities in China including the capital. That information will be combined with concurrent measurements being made by satellites and observatories on the ground that will track the transport of dust, soot and other pollution aerosols that travel from Beijing and other parts of China in so-called atmospheric brown clouds.
The instruments are observing pollution transport patterns as Beijing enacts its «great shutdown» for the Summer Olympic Games. Chinese officials have compelled reductions in industrial activity by as much as 30 percent and cuts in automobile use by half to safeguard the health of competing athletes immediately before and during the games.
«Thanks to the concern of Olympic organizers, the Chinese Government and the cooperation of the Korean government, we have a huge and unprecedented opportunity to observe a large reduction in everyday emissions from a region that is very industrially active,» said Scripps Oceanography climate and atmospheric sciences professor V. Ramanathan, the principal investigator of CAPMEX.
«CAPMEX is going to be the very first UAV campaign in east Asia for air pollution and cloud interaction studies,» added CAPMEX field campaign co-principal investigator Soon-Chang Yoon, a researcher at the School of Earth and Environmental Sciences at Seoul National University in Korea. «This will be a very interesting experiment that can never happen again.»
Satellite and ground observations began Aug. 1. Pre-inspection test flights are scheduled to begin Aug. 9 and the field campaign is expected to run through Sept. 30.
«Black carbon in soot is a major contributor to global warming,» said Ramanathan. «By determining the effects of soot reductions during the Olympics on atmospheric heating, we can gain much needed insights into the magnitude of future global warming.»
Ramanathan's team has revolutionized the gathering of atmospheric data through the use of AUAVs that enable researchers to form dimensional profiles of clouds and other atmospheric masses at relatively low cost. The scientists conducted their first successful experiment using AUAV data in the skies over the Indian Ocean during the 2005-2006 Maldives AUAV Campaign. Currently the Scripps researchers are also using the aircraft in the California AUAV Air Pollution Profiling Study, a nine-month-long survey of air pollution over Southern California.
In previous studies, meteorological data gathered by the aircraft helped demonstrate that atmospheric brown clouds can diminish the solar radiation that reaches Earth's surface, warm the atmosphere at low altitudes and disrupt cloud formation. With CAPMEX, scientists hope to improve their ability to deliver such assessments of particulate pollution effects more rapidly and enhance their value as a policymaking tool.
Miniaturized instruments on the aircraft measure a range of properties such as the quantity of soot and size of the aerosols upon which cloud droplets form. The instruments also record variables such as temperature, humidity and the intensity of sunlight that permeates clouds and masses of smog.
For CAPMEX, photonics instruments will be added to the aircrafts' payloads to help calculate the specific contributions

of various aerosols to atmospheric heating. Other new instruments such as auto-leveling platforms will enable researchers to improve estimates of how much dimming of sunlight takes place at the ocean surface because of pollution aerosols in the atmosphere.
«Ramanathan's earlier research on atmospheric brown clouds demonstrated their importance in how solar energy is distributed throughout the polluted regions of our atmosphere,» said Jay Fein, NSF program director for climate dynamics. «CAPMEX takes his work an important step forward with new innovative micro- and nano sensor technologies that will provide additional quantitative estimates of solar irradiance, aerosol cloud interactions, climate forcing and important components of the biogeochemical cycles of the East Asian and western Pacific Ocean region.»

DELAYS FORCE CANADA TO LEASE HELICOPTERS
By Daniel Leblanc
The Globe and Mail, Canada
www.theglobeandmail.com
August 8, 2008

The Canadian Forces announced yesterday they will fly leased Russian helicopters and second-hand U.S. ones in Afghanistan as the purchase of a new fleet of Chinooks is delayed by another two years to 2013.
The Harper government announced more than two years ago that it was buying 16 new medium- and heavy-lift helicopters from Boeing, but Defence Minister Peter MacKay said the $4.7-billion fleet would not be in use for another five years.
In the meantime, Mr. MacKay said, the government will quickly enter into a one-year lease for six Russian-made helicopters for service in Afghanistan at a cost of $36-million. Ottawa will then buy six used Chinook helicopters from the U.S. government at a cost of about $300-million, to be in service in early 2009.
Mr. MacKay added that the government will also obtain two fleets of unmanned aerial vehicles (UAVs) to patrol the skies of Kandahar province and increase the security of Canadian troops.
The new equipment will answer one of the biggest needs of the Canadian Forces, namely to see threats from afar so that soldiers can avoid them on the ground, as called for in a report by former Liberal foreign affairs minister John Manley. The military will use the helicopters to deliver supplies and move Canadian troops in Afghanistan, a response to the fact that roadside bombs have caused most of Canada's 88 deaths there.
Mr. MacKay said the new equipment is essential to fulfilling Canada's mission in Afghanistan, which ends in 2011.
«Our Canadian Forces have been in the unfortunate position of not having any other option than hitchhiking rides with allies in moving personnel in countries like Afghanistan,» Mr. MacKay said. «These days are over, as are the days of delays in purchases or enduring contract cancellations for political purposes.»
However, when the Harper government announced in 2006 that it was buying new Chinooks, it said «the requirement for this equipment is urgent.» Then-defence-minister Gordon O'Connor said the Chinooks were destined for use in Afghanistan.
«Overseas, the helicopters will reduce our reliance on allies and protect our troops on dangerous missions,» Mr. O'Connor said. «They will reduce cases in which our men and women in uniform must drive overland, exposing themselves to the risk of ambush, land mines and improvised bombs.»
It was long believed that the new Chinooks would arrive in 2011 at the latest, but Mr. MacKay said the new timeline calls on them to be operational only in 2013. In the government's literature, the new Chinooks are said to be for use «beyond Afghanistan.»
Negotiations between Ottawa and Boeing have been slowed by concerns over rising costs and discussions about the equipment to be included in the helicopters. The contract is expected to be signed later this year.
Liberal MP and defence critic Bryon Wilfert said the Conservative government has been «short on specifics and long on fanfare» in relation to the purchase of new helicopters.
Mr. MacKay also said yesterday that Canada is getting new surveillance drones to provide vital intelligence to the troops. The government will obtain smaller Scan Eagle UAVs for nine months at a cost of $14-million, and then lease Heron UAVs from MacDonald Dettwiler Associates for two years at a cost of $95-million.

IAF MAY TAKE PART IN ANTI-NAXAL OPS
The Times of India, India
http://timesofindia.indiatimes.com
August 8, 2008

It's for the government to decide whether it wants to use airpower in the ongoing counter-insurgency and anti-naxal operations in the country, IAF chief Air Chief Marshal F H Major said on Thursday. ''Every balanced air force in the world has the capability to handle the entire spectrum of conflict, ranging from low-intensity to high-intensity,'' said ACM Major. But, he added, the decision to use airpower against asymmetric warfare, insurgency or terrorism within the country ''has to be a very cautious and deliberate one'', which was strictly a decision for the government to make. ''If the government so directs, we are ready for it. Airpower, after all, can be used very effectively,'' said the IAF chief. Unlike before, when the use of airpower could lead to ''collateral damage'', IAF now had the capability to ''put a missile through a window,'' he said. The IAF does deploy helicopters, transport aircraft and UAVs (unmanned aerial vehicles) to aid the Army and paramilitary forces during operations against militants or naxalites but their use has been largely restricted

for logistical and surveillance duties till now.

PRESS RELEASE

GAASI, BAE SYSTEMS JOIN TO ENHANCE MILITARY ANALYSIS UNDER AIR FORCE CONTRACT
General Atomics Aeronautical Systems
San Diego, California, USA
August 8, 2008

General Atomics Aeronautical Systems Inc. (GAASI) and BAE Systems will jointly develop architecture to automate the detection and identification of ground battle targets. The companies will jointly integrate the U.S. Air Force Research Laboratory's Continuous Look Attack Management for Predator® (CLAMP) program under a $6 million Air Force contract. CLAMP will integrate a high-resolution Lynx® synthetic aperture radar (SAR) with other sensors on an MQ-9 Reaper unmanned aircraft under an effort called C-RIP, for CLAMP-Reaper Integration Program. GA-ASI builds the Reaper aircraft and Lynx radar. The C-RIP sensors will evaluate imagery collected by the radar during Reaper surveillance operations, detecting changes in the battle space, classifying enemy vehicles, and displaying results to analysts on the ground.
«This architecture is a significant leap forward in that it allows the synthetic aperture radar operator to use high-resolution imagery of the Lynx radar in parallel with other MQ-9 sensors,» said Linden Blue, president of GA-ASI's Reconnaissance Systems Group. «This program will enhance efficiency of image analysis by providing automated exploitation tools.»
General Atomics Aeronautical Systems and BAE Systems in late 2007 signed a memorandum of understanding that joins GA-ASI's development of reconnaissance sensors and sensor control systems for unmanned aircraft systems with BAE Systems' expertise in sensor data processing and exploitation.
«BAE Systems' intelligence, surveillance, and reconnaissance exploitation systems will maximize the capabilities of the GAASI sensor and sensor control systems for unmanned aircraft systems such as Reaper,» said Nils Sandell, vice president of advanced information technologies for BAE Systems in Burlington, Massachusetts. «Combining our expertise, we can provide improved capabilities to ensure the effectiveness and safety of U.S. armed forces.»
Work on the contract will be performed through September 2009 at GAASI's facilities in San Diego and BAE Systems' facilities in Burlington.

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PRESS RELEASE

QinetiQ achieves UK's first unmanned flight for agricultural crop monitoring
QinetiQ, UK
August 8, 2008

QinetiQ, working in partnership with Aberystwyth University's new biosciences centre IBERS, has successfully completed the UK's first flight of an autonomous unmanned aerial vehicle (UAV) for agricultural monitoring.
The flight was the culmination of phase one of the pioneering U-MAP programme, a project supported by the Welsh Assembly Government. U-MAP (UAVs for Managing Agricultural Practice) has demonstrated the feasibility of using a UAV to deliver high resolution images to the agricultural, forestry and environmental monitoring sectors.
Farmers and foresters increasingly need accurate and timely information on the state of the land they occupy. For example by mapping the fertiliser requirements of arable crops, farmers can ensure they only apply the precise amount of fertiliser required, saving them money and preventing the pollution that occurs when nitrate fertilisers are over-applied.
The QinetiQ team acted as systems integrator for the specially adapted UAV platform and flew a total of more than 15 flights during the «work-up» phase and in support of data gathering. The UAV captured specialised video images that were used to create NDVI (normalised difference vegetation index) maps – sensitive indicators of the amount of vegetation present that can be used to determine fertiliser requirements.
«The UMAP project brings together emerging UAV technology with the growing need for farmers to fully understand the land they have under cultivation,» commented Clive Richardson, Chief Operating Officer for QinetiQ's EMEA business.

«With these recent flights we have successfully shown that UAVs are an affordable and flexible alternative to manned aircraft and satellites for the remote sensing of agricultural land.»

INDIAN NAVY FLEET TO GROW TO 160-PLUS BY 2022
Thaindian News, India
www.thaindian.com
August 9, 2008

The Indian Navy aims to expand its fleet to more than 160 ships, the majority of them indigenously-built, by 2022, navy chief Admiral Sureesh Mehta has said. Delivering a talk on the Future Vision of the Indian Navy here Friday, Mehta said the Indian shipbuilding industry has a very sound base and most of the future platforms will be built in the country.
«We have great ambitions in warship building. Currently 38 vessels, including one aircraft carrier, three frigates, six submarines, one landing ship, and four anti-submarine vessels are under development,» Mehta said.
«Induction of new aircraft including MiG-29K fighters, maritime reconnaissance aircraft, airborne early warning and control systems (AWACs) and unmanned aerial vehicles (UAVs) is in the offing,» he said.
Seeking policies that favour indigenous shipbuilding, the navy chief underlined that the country's indigenous ships are small by global standards and that only 10 percent of ships owned by India are Indian-built.
«By 2022 the Indian navy will have a fleet of 160-plus ships, three aircraft carriers and 400 aircraft of different types. Extensive satellite surveillance and networking will be there,» Mehta added.
Currently India has only one aircraft carrier - INS Viraat. Besides, the navy is looking forward to a greater network centricity to keep track of all the vessels in the fleet and can be instrumental in faster deployment of platforms. The navy chief also called for greater engagement of regional and extra-regional navies and space-based surveillance of the maritime battle space.

CANADA CONTRACTS FOR HERON UAVs
Defense Industry Daily, USA
www.defenseindustrydaily.com
August 10, 2008

Israel Aerospace Industries' Heron is a large MALE UAV in the MQ-1 Predator's Class. It is primarily used as a surveillance UAV over land and sea, and can be equipped with a number of modular radar, sensor, and even electronic intelligence packages. The 2006 war in Lebanon also demonstrated that they could be armed, if necessary. Heron currently serves in Israel (Heron 1 and Heron TP), India, Turkey, and in France as the SIDM/EuroMALE variant.
The UAV will also begin serving Canada in Afghanistan, under an arrangement that parallels Britain's interim lease of Hermes 450 UAVs from the UTaCS consortium of Thales UK and Elbit Systems. In Canada's case, the Ardea partnership that supplies and operates the UAVs involves Elbit's rival IAI, and Canadian surveillance & aerospace firm MacDonald, Dettwiler and Associates Ltd.
MDA's surveillance solution will be operational in Afghanistan before February 2009. The initial C$ 95 million (about $90 million) UAV operations and training contract will keep the Herons in service until early 2011, with a C$ 35 million option for an additional 3rd year. MDA release.
Canada has a JUSTAS program that includes UAVs in this class, just as Britain has its Watchkeeper UAV program. The Herons do fill the Phase 1 near-term MALE UAV requirements under JUSTAS, but the longer-term choices seem unlikely to be made until Phase 2. Meanwhile, MDA and IAI are promoting the Heron UAVs as a cheaper option for search-and-rescue (SAR) and related surveillance tasks over Canada's boreal forests and northern regions. A July 10/08 exercise in Suffield, Alberta involved the Heron UAV finding the wreckage of a 'crashed' Cessna, and coordinating the 'rescue' of Canadian MP Art Hangar. The Canadian Civil Air Search and Rescue Association attended and commented approvingly, and the Discovery Channel filmed the exercise.

BOEING TO EXPAND ITS UAV OPERATION IN VICTORVILLE
City Council Approves Three-Year Hangar Lease
The Aero-News Network, USA
www.aero-news.net
August 12, 2008

Boeing's unmanned A160T Hummingbird helicopter has legs... and we're not just talking about its recent endurance record. The program appears headed for a long future, with the company planning to significantly expand its operations at Southern California Logistics Airport (VCV) in Victorville.
The Victorville Daily Press reports the City Council recently approved a three-year lease for Boeing at the airport. Under terms of the deal, Boeing will pay the city $4,099 per month for the first year's lease on Hangar 879 at the former military installation. The rent will go up 3 percent for the second and third years.
Boeing's exact plans for the almost 7,000-square-foot building are classified... but Boeing spokesman Steve Mattei said the company plans to use the extra room to expand the A160T program, and continue development. Boeing already works from a number of other buildings at VCV.

As ANN reported, in May the Hummingbird established a new world endurance record for UAVs weighing between 1,102 and 5,511 lbs., of 18.7 hours. Boeing has tested the Hummingbird in Victorville since 2002, under a Defense Advanced Research Projects Agency contract. The program has suffered two minor crashes, including one last December.
«This has been an aggressive flight test program, and A160 has made excellent progress,» said DARPA program manager Phil Hunt. «The result has been a steadily increasing level of confidence and reliability.»
Boeing plans for the Hummingbird to eventually fly up to 36,000 feet.

CANADA BOOSTS AFGHAN SUPPORT
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
August 11, 2008

Canada is leasing helicopters and unmanned air vehicles to increase support for its troops in Afghanistan. Up to eight Mil Mi-8 chartered commercial helicopters will be available later this year under a renewable one-year contract worth C$36 million ($34.2 mil-lion). They will precede six used Boeing CH-47D Chinook helicopters that are to be purchased from the U.S. for $292 million and available by February 2009. ScanEagle small UAVs leased from Boeing under a nine-month, C$14-million turnkey service contract have been in Afghanistan since June, and MacDonald, Dettwiler & Associates has won a C$95-million contract for the two-year lease of an Israel Aerospace Industries Heron medium-altitude long-endurance UAV system to be delivered early next year.

GLOBAL HAWK SUPPORT
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
August 11, 2008

Northrop Grumman's Integrated Systems Div will supply engineering and technical services to support the two Global Hawk unmanned aircraft being flown by NASA's Dryden Flight Research Center. The aircraft provide long-distance, long-endurance high-altitude platforms for NASA instruments.

GPS BOOST
Aviation Week & Space Technology, USA
www.aviationweek.com/awst
August 11, 2008

The U.S. Naval Research Laboratory (NRL) has awarded a $153-million contract to Boeing to demonstrate new concepts to make the GPS signal more jam-resistant. The High Integrity Global Positioning System demonstration is expected to run through 2010 and combine signals from the Iridium telecommunications system in low Earth orbit with signals from the GPS constellation in medium Earth orbit.

VIRTUALLY UNMANNED
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Ground systems developed as part of the U.K.'s Astraea program to examine the use of unmanned aerial vehicles (UAV) in non-segregated airspace are being tested throughout all this month. Pilots, navigators and air traffic controllers are taking part in trials using the ground station to fly a simulated UAV mission. Results of the tests will be used to help further development of ground control station software.

WHAT HAPPENED TO 'ONE FOR ALL, ALL FOR ONE'?
By Lewis Mackenzie
The Globe and Mail, Canada
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So, Canada has worked out a way to provide our troops with medium-lift helicopters in southern Afghanistan: a one-year lease for six Russian-made helicopters that will cover us until we can purchase six used Chinooks from the U.S government next year. Total cost? More than $300-million. This simple but telling example is, in my mind, the final nail in NATO's coffin.
The Atlantic Alliance was a successful bulwark against the Soviet Union from 1949 until the early 1990s and the end of the Cold War, but in today's more complex world, it's time for it to «rest in peace.»
There are more than 3,000 medium-lift helicopters sitting safely on the ground far, far away from Afghanistan, at airbases

located in NATO's 26 member countries. Three thousand, and Canada is stuck with providing helicopter support, not just for its own troops, but for all the other national contingents in Region South.
For you civilian readers, let's talk numbers. The soldiers we have fighting the Taliban outside the wire in Afghanistan are categorized in military lingo as a battle group. Figure around 1,000 soldiers, although with leave programs and other requirements plucking individuals out for various reasons, somewhere between 600 and 800 fighters are usually available for front-line duty. Battle groups don't rate their own medium-lift helicopter support. Think, instead, the next higher level of command that we military types call a brigade - more like 4,000 to 5,000 soldiers. The headquarters of such an organization assigns centralized resources, such as logistics support, unmanned aerial vehicles, intelligence, artillery support and yes, medium-lift helicopters, in accordance with each battle group's needs as required. There are usually three battle groups in each brigade and demands will vary in priority as the battle unfolds.
In Afghanistan, the brigade level of command has been renamed Region South, and that is where the Canadian leased and/or purchased used helicopters will be controlled. Other national contingents, such as the British and the Dutch fighting the Taliban in Region South, would quite properly receive support from our «Canadian» helicopters.
Any NATO member that is counting on its fellow 25 members to rush over the horizon and rescue it from annihilation in the event of an attack should closely observe what is happening in Afghanistan today. This war has demonstrated, yet again, that the immortal words of the Three Musketeers, «One for all, all for one!» - enshrined in the NATO charter in much more eloquent language - counts for absolutely nothing.
In NATO's first and only mission involving real risk - bombing the former Yugoslavia, including Kosovo, from 10,000 feet and encountering no opposition, where no one in NATO scratched a finger, can't be classified as risky - few member countries have lived up to the obligations inherent in the charter.
It's one thing to hesitate to put your soldiers in danger when the chances of casualties are extremely high, but to hesitate, nay, refuse to dispatch medium-lift helicopters to an operational theatre to assist in the delivery of soldiers and logistical support over a dangerous battlefield is reprehensible. If you don't agree with the mission, and are too cowardly to participate, then resign from the alliance.
Granted, during the Cold War, Canada was found wanting on occasion. In the mid-1970s, prime minister Pierre Trudeau arbitrarily cut our NATO commitment in Europe by 50 per cent, leaving our contribution to opposing any Soviet attack to be measured in minutes, not days. However, after 9/11, when our national resilience to painful sacrifice was put to the test, our soldiers and public proved equal to the challenge, joining an all-too-small number of NATO countries of similar determination. There is no doubt the Canadian Forces need medium-lift helicopters for any number of tasks at home and abroad. However, the responsibility to provide them in a NATO operational theatre - the alliance's first - is not Canada's. It's time to check around to see who our real friends are. Three thousand helicopters in NATO - and all we asked for was six. Go figure.

FCS TECHNOLOGIES PUT TO THE TEST BY U.S. ARMY
By Kris Osborn
Defense News, USA
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Two-foot long vertical takeoff UAVs, 30-pound tactical robots equipped with infrared cameras, and groups of small, static ground sensors all sent battlefield images in real time through a high-bandwidth network from a mock-combat village set up near Fort Bliss, Texas, to U.S. Army Future Combat Systems (FCS)-networked Humvees several hundred yards away.
It was a significant step for the FCS network, which used software-programmable Joint Tactical Radio Systems (JTRS), high-bandwidth Soldier Radio Waveform (SRW) and next-generation FCS computer technology to move images and information with greater effect than previously demonstrated, said Brig. Gen. James Terry, Director Future Force Integration Directorate, Fort Bliss.
The July 27-31 live exercise, called a Preliminary Limited User Test, was the first time FCS technologies were put to the test with infantry brigade combat teams in tactical, combat-like scenarios. «Battlefield commanders [in the test] were able to use this equipment in live, evolving scenarios,» said Paul Mehney, an FCS spokesman.
Prior to this test, FCS was able to demonstrate moving images with SRW between FCS-networked vehicles and Unattended Ground Sensors (UGS) placed in static positions on the battlefield to beam back images of enemy activity. However, in recent months the FCS program has been able to add the Micro Air Vehicle (MAV) UAV and the Small Unmanned Ground Vehicle (SUGV) robot to the high bandwidth Soldier Radio Waveform network, enable them to send real-time images as well.
The aim of the July test was to examine the emerging FCS network's ability to detect and destroy enemy snipers, paramilitary threats, and vehicle-borne IEDs along with other fast-moving insurgent targets, in part by sharing information across a networked force. At the same time, the networked sensors were also tested to identify areas of civilian activity on the battlefield and thereby reduce collateral damage in an urban environment where insurgents are known to deliberately blend in with the local population.
«They had a platoon-level force coordinate search operations of a village. They sent the SUGV into a building, first in a fairly densely populated civilian area. They were able to then use that sensor data to advise a platoon as to which

buildings to work through. They did find resistance in one of the buildings,» Mehney said. «All sensors platforms using SRW were able to send image information to JTRS GMR [Ground Mobile Radio] in the B-bits, so scouts in the Humvees were able to better direct tactical operations,» he said.
The FCS spinout technologies, which include the Micro Air Vehicle UAV, Small Unmanned Ground Vehicle tactical robot, Tactical and Urban Unattended Ground Sensors, Non-Line-of-Sight Launch System (NLOS-LS), FCS-networked vehicles (B-kits) and the first increment of the FCS network, are slated to field with Infantry Brigade Combat Teams (IBCTs) by 2011. The test was the first major FCS exercise since the Army's June decision to field FCS technologies with IBCTs instead of the previously planned Heavy Brigade Combat Teams.
The B-kits include early versions of FCS software, computers and battle command technologies outfitted on current force vehicles such as Humvees, Bradleys and Abrams tanks; the gear, used on Humvees in the test, includes the FCS computer called Integrated Computer System (ICS), a middle-ware operating system called System of Systems Common Operating Environment (SOSCOE), JTRS Ground Mobile Radio (GMR) and Force Battle Command Brigade-and-Below (FBCB2)/Blue-Force Tracking display screens.
During the exercise, FCS computers in B-kit Humvees were able look at live images from nearby MAVs designed to hover and stare above potential enemy locations. «The B-kits, ICS and gateways associated with the sensors allow data to flow into the FBCB2 displays. If you are looking at the controller for the MAV, you will see exactly what the MAV sees. That allows you to send frames and populate the FBCB2 screen with some pretty good granularity,» said Terry.

Future FCS Capabilities

As more lines of software code for the FCS network are finished and SOSCOE further evolves, B-kit and FCS vehicles will be able to display much larger amounts of information such as full-motion, real-time video from nearby UAVs.
«The SOSCOE we are using is one that has been made for the spinouts but will have a larger capability in the future. The battle command applications are tailored to spinout one, but they are a subset of what is being built for the larger program,» he said.
FCS also plans to field improved radios as they become available, such as JTRS Handheld Manpack Small Form Fit (HMS) radios for the UGS, SUGV and dismounted soldier.
«We always want material developed faster. We are using pre-EDM [engineering design model] radios. We will move to prototype before we get to the fielding of the first IBCT,» said Army Lt. Col. Ed House, Commander of the 2nd Combat Aviation Brigade, Army Evaluation Task Force.
Along these lines, The Army is planning to integrate a communications apparatus for the dismounted soldier, Ground Soldier Ensemble (GSE), with the FCS network. GSE is slated to deploy alongside the FCS spinouts in 2011.
«Ground Soldier Ensemble includes looking at an individual soldier radio probably with video and voice as a minimum and maybe some minor data capability. The whole thought is to have a low cost radio. It will draw lessons learned from Land Warrior. I don't know if it will be a direct next generation Land Warrior. We've made some adjustments to Land Warrior, and our acquisition strategy for GSE will build on lessons learned from Land Warrior,» said Army Lt. Gen. Ross Thompson, military deputy to the Assistant Secretary of the Army for Acquisition, Logistics, and Technology.
«Spinning out technologies to IBCTs also includes making GSE to be fielded to the same IBCTs on the same schedule as you field the FCS technologies. It is a package deal. The strategy is not just FCS but also Ground Soldier Ensemble because you got to enable the soldier because that is the most important piece of the overall operation,» he said.

Army More Confident of Funding

Demonstrating FCS technologies in actual scenarios with soldiers is resonating with Pentagon leaders and lawmakers responsible for the program's budget, which has sustained numerous cuts in recent years.
However, the FCS program's $3.6 billion budget request for 2009 has been receiving recent support in Congressional mark-ups; the House Appropriations Committee-Defense (HAC-D) fully supported the FCS budget request in recent budget mark-ups. In fact, the HAC-D added $33 million in funding for FCS to support the fielding of the spin-out technologies.
«Over the last three years there have been marks against the FCS program, but so far not in 2009, which to me is an indication that the members Congress and the staffers are seeing the benefits of the program reflected by their support in the budget,» said Thompson.
«One of the reasons why there is a lot more support for FCS now because you are seeing it demonstrated in operational scenarios and you are seeing now that these systems are put in the hands of soldiers. Once you start doing that, soldiers are the best spokespeople for the capability and it is resonating with members of Congress who are seeing the benefits,» he said.
Bringing roughly 1,000 soldiers to Fort Bliss to stand up the Army Evaluation Task Force [AETF] has been key to the program's recent progress, Army officials said.
«This whole thing with the AETF at Fort Bliss having today over 1,000 soldiers who are there to evaluate tactics, techniques and procedures and there to provide material feedback on the equipment - that is a huge investment on the part of the Army,» said Thompson. «It is a smart move. I'd rather know as early as possible 'hey make this change to this system' as early as possible because it will be better for me in the field.»

Alongside the planned 2011 FCS spinout deployment timeline, the Army is taking steps to allow for the possibility that additional accelerations of FCS technology in years to come. In particular, Rep. John Murtha, D-Pa. met with Army Chief of Staff Gen. George Casey earlier this year and indicated the possibility of Congressional support for adding as much as $20 billion to the overall lifetime budget of FCS.
«Congressman Murtha gave us a challenge and I think it was good challenge. I think the Army responded to that challenge - which was 'enough of the development stuff, when am I going to see hardware, results and things being put into the hands of soldiers'? The Army, when it submits the FY2010 budget, will put the amount of resources into FCS to execute against the requirements documents that are there now,» said Thompson. «It also has the resources that will enable us to get the spinouts to the IBCTs. The demonstrated success of that could require us to add more or it could engender Congressional interest in doing that.»

iROBOT NEGOTIATOR CIVIL RESPONSE ROBOT
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Best known to Gizmag readers for its range of home helper bots, iRobot is now expanding its line-up to include the growing need for public safety robots. The new iRobot Negotiator is a low-cost, tactical robot designed to meet the basic reconnaissance needs of public safety professionals, such as police and fire departments, counter-terrorism forces and domestic security experts.
While the company's PackBot 510 with First Responder Kit focuses on missions requiring a larger robot with more advanced capabilities, Negotiator will provide basic services to a much broader group of public safety professionals. The robot has applications for bomb squads, SWAT teams and surveillance, as well as hazardous material detection. «There is growing support and demand for unmanned ground robots as people recognize the difference they make by offering life saving 'eyes on' benefits to teams in the field,» said Joe Dyer, president of iRobot Government and Industrial Robots.
The Negotiator allows operators to see, hear and evaluate dangerous situations from a safe distance. For example, it is able to examine suspicious vehicles, packages and buildings without risk of harm to humans. Depending on the customer's needs, the robot may be outfitted with a civil response kit and a range of add-on accessories, enhancing its reconnaissance and chemical detection capabilities. Some of the add-on accessories include a pan/tilt day/night camera system (continuous 360° pan, 90° tilt), a low light infrared illuminated camera system, a rear mounted fixed day/ night camera system, a rear mounted light (combination IR and visible flood light system) and the MultiRAE Plus gas monitor detection system.
Operating at speeds up to 3.1 mph (5.0 km/h) the Negotiator is able to climb stairs, plus it is small enough to fit in the trunk of a car. Its two NiMH are good for between 3-6 hours on a single charge depending on the mission profile.
The Negotiator, which will be available for purchase in the fourth quarter of 2008, is being pitched as a robot with a low entry price point (around the US$20K mark) making it accessible to local, state and federal agencies that would not be able to afford a reconnaissance robot otherwise.

UNIVERSITY OF MARYLAND WINS UNMANNED UNDERWATER VEHICLE COMPETITION
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The University of Maryland has won the 11th Annual International Autonomous Underwater Vehicle Competition, in San Diego California. The event is organized by the Association for Unmanned Vehicle Systems International and the Office of Naval Research, and challenges universities to design and build an AUV capable of navigating realistic underwater missions.
Twenty-five teams from the US, India, Canada and Japan participated in the AUV competition, which involved dead reckoning approximately 50 feet through the starting gate, pipeline following, buoy docking, tracking and hovering over an acoustic pinger, grabbing an object and surfacing with the object to a floating ring.
Coming second in the competition was the University of Texas at Dallas, followed by École de technologie supérieure. A full list of the placings can be found here. The competition also gave out several special awards: the University of Colorado at Boulder won Best New Entry; the Delhi College of Engineering won Most Improved; the University of Wisconsin won the Tupperware Use Award; the University of Ottawa won Persistence in Adversity; and Norwich University won the Innovation Award.
On August 8, the AUVSI and ONR also held its first International Autonomous Surface Vehicle Student Competition, at San Diego's 40 foot deep Transducer Evaluation Center Pool. The craft will have to face challenges including passing through a starting gate and steering a steady course, navigating between buoys, detecting and eliminating shore bound threats, docking and recovering a victim. Embry-Riddle University, Florida Atlantic University, École de technologie supérieure, the University of Central Florida, the University of Michigan, and Villanova University are competing.

UNMANNED UNDERWATER VEHICLES TAKE ADVANTAGE OF ADVANCED SENSORS AND PROCESSORS FOR NAVIGATION AND ARTIFICIAL INTELLIGENCE

Navy experts & industry leaders are looking into the latest generation of unmanned underwater vehicles (UUVs) for maritime applications ranging from training and mission rehearsal, undersea surveys and surveillance, locating and destroying enemy mines, and potentially even covertly deploying weapons

By John Keller

Military & Aerospace Electronics, USA

http://mae.pennnet.com

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For the past three decades U.S. Navy experts have relied on unmanned undersea vehicles (UUVs), first as programmable targets to train anti-submarine warfare (ASW) crews on surface ships, and later as remote sensing platforms. Today the Navy is increasing its use of UUVs for counter-mine warfare, and is beginning to use autonomous undersea vehicles to map the ocean floors, locate submerged wrecks and obstacles, and occasionally to find and photograph underwater archeological sites.

In the future, advances in machine intelligence, closed-system propulsion, long-life rechargeable batteries, digital data storage, through-water communications, and rugged environment embedded digital signal processing promise a era in UUV applications, which are expected to include surveillance and reconnaissance; relocatable covert communications and networking nodes; electronic warfare; anti-submarine tracking; and perhaps even weapons delivery.

The world's oceans continue to be increasingly dangerous places, so military and commercial maritime interests will keep looking to autonomous watercraft to keep humans out of harm's way in the unforgiving environment of the sea.

The Need for UUVs

The Navy and global maritime industries, such as offshore oil exploration and production, have long had a need for unmanned underwater vehicles. It is only recently, however, that UUV technology has been advanced sufficiently for a broad variety of applications. The need for UUVs is driven primarily by safety. The more UUVs are put into operation, the fewer humans will be required to work in dangerous underwater environments, wearing diving gear or in manned submarines.

Sheer numbers also enter the equation. On the military side, large numbers of UUVs have the potential not only to replace humans in dangerous jobs, but also to augment the jobs they replace. One case in point: the U.S. has a limited supply of manned attack submarines to patrol economic and political hot spots throughout the world, yet large numbers of UUVs have the potential to keep an eye on important places in the ocean, and to work together with the manned submarine crews.

Consider the offshore oil industry, which often faces dangerous operating conditions in increasingly deep and dangerous coastal waters. Robotic underwater vehicles could help this industry safe money and keep workers safe by remotely inspecting and maintaining pipelines, assisting in drilling, and cleaning up any debris. Offshore oil drilling and production rigs of the future also may be submerged so as to free the pristine coastal vista of ugly offshore rigs. On such a structure, UUVs would be increasingly valuable for inspection and maintenance.

History

UUVs of one type or another have been in use since the 1970s anti-submarine warfare training. The latest modification (mod-2) of the Lockheed Martin MK 30 tactical UUV is a heavy torpedo-sized vehicle designed to simulate the movements, sounds, and magnetic signatures of a variety of submarines to enable ASW ships and aircraft to detect, track, and even fire non-exploding weapons at the MK 30 to hone their skills.

The MK 30 UUV target, which can be launched by submarine, ship, or aircraft, has limited autonomy and limited reaction to ASW tactics, explains Daniel French, head of the autonomous undersea vehicles division at the U.S. Naval Undersea Warfare Center (NUWC) in Newport, R.I. Nevertheless, compared to UUV prototypes and even some deployed systems, the MK 30 capabilities are somewhat primitive. «Targets are specific-purpose vehicles,» French says.

NUWC is the U.S. Navy's center of excellence for unmanned underwater vehicles. The center maintains an engineering staff able to design and test UUV concepts, as well as contracting and technology experts who supervise and evaluate UUV development, experiments, and testing at defense contractors. NUWC reports to U.S. Naval Sea Systems Command in Washington.

UUV prototype development over the few years has embraced many platform shapes and sizes, which have come with advances in UUV enabling technologies like software for vehicle autonomy, batteries and propulsion, sensors, and fast signal processing. The large Manta UUV was developed at NUWC as demonstration platform for autonomous technologies, and from time to time has been considered roles like persistent surveillance and weapons delivery.

The vehicle is big - more than 34 feet long, weighing about 30 tons. It has 21-inch pressure hulls, and can accommodate 5,000 pounds of payload in its hull and atop its sail, which looks like the tail of a jetliner. Over time Manta has been envisioned as simply a modular test bed for system demonstration, as well as a weapons-carrying mothership capable of deploying torpedoes, cruise missiles, or smaller UUVs.

If the Navy ever had serious plans for the Manta in an operational role, those plans have since been put on hold. «She's

really just a hangar queen now,» says Christopher Egan, UUV customer advocate at NUWC. Manta has not been in the water for quite some time, and stored at NUWC. The large vehicle could always be dusted off later if Navy officials would like to resurrect experiments with large UUVs.
Navy scientists also have been experimenting with the Solar Autonomous Undersea Vehicle, otherwise known as SAUV, which is designed by Falmouth Scientific Inc. in Cataumet, Mass. NUWC experts use this solar-powered craft as a test bed for developing machine autonomy capability, and for experiments with long-endurance surveillances - especially when networking these vehicles and operating them as tag teams.
The SAUV can operate submerged for about five hours, but then must surface for five hours to recharge its batteries via an array of photovoltaic cells mounted on top of the vehicle. Networking these vehicles as tag teams might enable one charged vehicle to pick up where another left off when its batteries ran low and the vehicle surfaced for a recharge.
It's no accident that American UUV development is centered in England. Much of the nation's UUV technology development revolves around UUV research centers of excellence at the Massachusetts Institute of Technology (MIT) in Cambridge, Mass., and at the Woods Hole Oceanographic Institution in Woods Hole, Mass. NUWC is less than an hour or two's drive from MIT and Woods Hole.

Enabling Technologies

One of the difficulties of UUV development today is designing a vehicle with some level of machine autonomy. That means the vehicle must be able to adapt its actions to changing conditions, draw conclusions and make decisions based on information it picks up during missions, and must have an interrupt-driven architecture to enable the vehicle to change its direction, speed, tactics, and primary sensors if human operators give it an expected high-priority task during a mission.
Key enabling technologies for this kind of capability include software algorithms for vehicle autonomy; high-endurance batteries able to withstand the rigors and harsh environment of prolonged maritime operations; closed-system propulsion systems able to operate for long periods on little power and little, if any, access to oxygen; and fast, power-efficient embedded computing and digital signal processing to transform sensor data into useful, actionable information. «Batteries, sensors, and signal processing are our technology thrusts,» says NUWC's French.
One important unmanned test vehicle at NUWC is MARV - short for mid-sized autonomous research vehicle - which is 16 1/2 feet long and just slightly more than one foot in diameter for testing different UUV programs and technologies. «Energy is one of our biggest thrusts,» French explains. «On MARV, where can operate for 20 to 24 hours on one lithium ion (LiOn) battery charge,» French explains.
For some applications, 24 hours between battery charges might be enough, but Navy officials are not satisfied with that. «The Navy wants to operate for days, not hours,» French says. As a result, NUWC experts are investigating the use of long-endurance propulsion methods like burning metals and solid-oxide fuels cells. Ultimately, however, «I think the answer will be in batteries,» French says.
Although battery power for UUVs still has a long way to go, there was a time not long ago when batteries were show stoppers, not enablers, where autonomous underwater vehicles were concerned. «A lot of our technology in years past was geared around how to create a system that would go down by itself and survive,» says Christopher Wallsmith, chief technology officer at UUV designer Bluefin Robotics in Cambridge, Mass. «The energy systems at that point didn't have any good solutions for rechargeable batteries. The technology was silver zinc, but could outgas hydrogen.»
Bluefin engineers have developed a pressure-tolerant rechargeable battery system, based on lithium polymer technology. «They don't outgas when we recharge them,» Wallsmith says. «We might be able to pod them in a solid pack and not have to provide a mechanism for the gas to escape. You can put in the wet part of the vehicle rather than in a pressurized compartment.»
Vehicle autonomy - or providing UUVs with some degree of intelligence - also is a major technological thrust in the undersea robot community. «The thing that enables autonomous underwater vehicles (AUVs) is autonomous software,» explains David Kelly, president and chief executive officer of Bluefin Robotics
As UUV designers attempt to make their machines smart, however, they must consider several different levels of machine autonomy, which Kelly calls «layers of abstraction.» One level of autonomy, for example, might encompass the safe control and operation of the vehicle. Designers must program in machine behavior that might enable the vehicle to swim out from a launch vessel, dive, and run a track-line survey of the ocean bottom and surrounding water columns, and then surface safely for recovery, Kelly explains.
«Another layer in the research and development realm is cooperation between vehicles,» Kelly says. «We have experiments where you have several vehicles operating simultaneously. Based on what one vehicle might find, the behaviors of the other vehicles would change.» Enabling several UUVs to work together might help operators cover broader search areas, and might help UUVs with different kinds of sensor packages to bring their best strengths to bear, he says.
Not all of the technology necessary to give UUVs autonomous capability is to the undersea community, explains NUWC's French. «We work with the Jet Propulsion Laboratory, and the Mars Rover has similar autonomous behavior to what we use.»
Enabling a UUV to navigate without intervention from a human operator is a technological challenge closely related to vehicle autonomy. «We have had a challenge with the accuracy of underwater navigation without GPS [the satellite Global Positioning System] or something similar,» Wallsmith says. «We have developed high-accuracy underwater

navigation with a compass and Doppler velocity log, and with some GPS correction when you come to the surface.»
Embedded computing and fast signal processing also is a driving technology for UUV development. One of the primary reasons for this is the difficulty of sending large amounts of data over wireless links through the water; through-water bandwidth is miniscule compared to what is possible through the air. As a result, UUV designers must be extremely careful about what they plan to send over data links - unless they intend to surface their vehicles, which can be dangerous.
Wireless links over the air have such broad bandwidth that systems designers easily can plan on sending raw sensor data from antenna to antenna. This is not possible with through-water data links. If UUVs cannot process data onboard, then often they must store the data and download it for processing after completing the mission and being recovered to surface ships or aircraft.
«There is a big demand to do on-board signal processing, and off-board a reliable piece of information,» says NUWC's French. «We have no advantage of bandwidth in the UUV community. UUV bandwidth is limited by physics. We have a capacity of tens-to-low-hundreds of kilobits per second.» Technologies are being developed for high-bandwidth through-water communications with lasers, but even that approach would be limited by distance.
«A lot of the data from sidescan or synthetic aperture sonar is not processed on board today,» says Bluefin's Kelly. «You could do it on board to reduce the data you need to store.» He points out, however, that for data-gathering tasks that are not time-sensitive, there is little need for extensive on-board signal processing. «If you need to change the mission, like for mine countermeasures, you need on-board processing,» he cautions.
«Better sensor processing on the vehicle means sonar processing and algorithms for making decisions based on that sonar data without a human operator in the loop or with little communications,» says Bluefin's Wallsmith.

Applications

Near-term applications for generations of UUVs span a wide range, from intelligence, surveillance and reconnaissance; mine countermeasures; anti-submarine warfare; inspection and identification; oceanography; communications and navigation network nodes; payload delivery; information operations; and time-critical strike, according to the Navy Unmanned Undersea Vehicle Master Plan.
Today's primary use for UUVs is technology demonstrator at research centers like NUWC, followed closely by maritime mine countermeasures and surveillance and intelligence gathering.
For technology demonstration and experiments, one of the most important UUVs at NUWC is 16 1/2-foot MARV, which demonstrates imaging sonar systems for UUVs. Famed oceanographer Robert Ballard - the man who found the wreck of the ocean liner Titanic - used MARV to explore underwater archeology sites off the coast of Virginia, says NUWC's French.
MARV also helps Navy oceanographers make maps and images of the ocean floor to help future generations of UUVs navigate over long periods without the need to surface periodically to take a GPS fix. UUVs have inertial navigation systems, but typically experience drift of about five meters per hour. Accurate image databases of the ocean bottom could help future UUVs navigation from visual fixes on the bottom.
Also developed at NUWC is the Advanced Development Unmanned Underwater Vehicle (ADUUV), which is made of titanium and is design to accommodate a wide variety of modular sensor and communications payloads for different missions. Modular UUV payloads are expected to be applicable to several different vehicles. «You want to avoid the need to re-invest in the same kinds of payloads for different UUVs all the time,» says NUWC's Egan.
NUWC's REMUS 600 vehicle, short for remote Environmental Monitoring Units, designed by Woods Hole, also is for testing synthetic aperture sonar technology, which can map the ocean bottom covering large areas quickly with fine resolution imaging.
Another NUWC UUV is the 21 UUV, which is the same size as a Navy MK 48 heavy torpedo. Navy experts are using this as a test bed for surveillance, reconnaissance, and electronic intelligence. The prototype UUV is fitted with a mast with RF and optical sensors, as well as a keel that lowers to keep the vehicle balanced when the sensor mast rises.

Counter-mine UUVs

Counter-mine warfare is another major thrust in UUVs. One of highest-profile systems is the AN/WLD-1 Remote Minehunting System (RMS) - a 23-foot semi autonomous, semi submersible vehicle that locates and classifies sea mines. The system's manufacturer is the Lockheed Martin Undersea Systems division in Riviera Beach, Fla.
The RMS can function under control of a human operator or on its own. It is a small diesel-powered submarine with a snorkel and antenna mast that always sticks out of the water. The system's mission is to detect and pinpoint mines in the water so other systems can come back and destroy them later or so Navy commanders can switch alter their missions to avoid minefields.
The AN/WLD-1 system can operate for the better part of a day, and is deployed aboard Arleigh Burke-class guided missile destroyers. It has an onboard camera to navigate and avoid obstacles, and uses the Raytheon AN/AQS-20 Minehunting Sonar System, which the AN/WLD-1 tows behind it at variable depths to locate mines.
Boeing Advanced Information Systems in Anaheim, Calif., builds the AN/BLQ-11 Long Term Mine Reconnaissance System (LMRS), a torpedo-sized UUV that is deployable from surface ships or from the torpedo tubes of the Navy's Los

Angeles- and Virginia-class fast attack submarines to survey potential mine fields. Sonatech Inc. in Santa Barbara, Calif., builds the advanced forward-looking and side-looking mine detection and classification sonars as well as the homing/docking and acoustic telemetry sonars for the AN/BLQ-11.
The Talisman UUV from BAE Systems Underwater Systems in Waterlooville, England, is designed to operate in coastal waters and harbors to perform mine counter measures and oceanographic work. Communications to and from the vehicle are via WiFi or Iridium satellite communications, and with an acoustic link when the vehicle is submerged. Battery power enables the Talisman to operate for as long as 24 hours.
Bluefin makes several kinds of UUVs, ranging from the Spray autonomous underwater glider to the Bluefin 21, a heavy torpedo-sized UUV. The Spray can glide up and down the water column by changing its displacement with a hydraulic pump. It can be used for environmental surveillance, and its developers envision a potential application to inspect the hulls and structures of piers for homeland security applications.
Glider-type UUVs, which are designed to move slowly through the water, perform sharp maneuvers, and to hover in place even in heavy currents or turbulent seas, also have the potential for marine industrial applications like offshore oil exploration and production. Glider UUVs might be able to inspect underwater pipelines and structures and help with repair operations.

PRESS RELEASE

Navy's BAMS UAS Program Begins After GAO Ruling
Northrop Grumman Corporation, Los Angeles, USA
August 12, 2008

The U.S. Government Accountability Office's decision to deny the protest of the U.S. Navy's Broad Area Maritime Surveillance Unmanned Aircraft System (BAMS UAS) source selection allows efforts to begin under Northrop Grumman Corporation's (NYSE:NOC) prime contract. The GAO's ruling underscores that the Navy conducted a fair and open competition to choose a provider for the service's newest UAS for intelligence, reconnaissance and surveillance missions. «We are very pleased that the GAO has upheld the Navy's source selection decision for the BAMS UAS program,» said Ronald D. Sugar, Northrop Grumman chairman and chief executive officer. «This reaffirms that Northrop Grumman's offering was selected as the best-value determination in a fair and open competition. We look forward to getting back to work on this critical program for our Navy customer.»

AUSTRALIA PLACES SKYLARK UAV ORDER
By Trevor Moss
Jane's Defence Weekly, UK
www.defensenews.com
August 13, 2008

The Australian Department of Defence (DoD) has placed a third order for Skylark I mini unmanned aerial vehicles (UAVs), the aircraft's manufacturer Elbit Systems announced on 3 August. The undisclosed number of Skylarks, bought for «several million dollars», is destined for the Australian Army, which has already been operating 10 of the aircraft in Iraq and East Timor, the DoD told *Jane's.*
The hand-launched UAV, which has a weight of 5.5 kg and an endurance of two hours, is used for 'over-the-hill' reconnaissance and surveillance at distances of 10-15 km. The Skylark is operated by Australia alongside the larger Boeing ScanEagle UAV as part of a «layered approach» to intelligence, surveillance and reconnaissance (ISR) operations. Australia is leasing its ScanEagle equipment from Boeing, pending the arrival of the delayed I-View MK250 UAV, now scheduled for late 2011.
«The Skylark can complement the ScanEagle through 'cueing' the ScanEagle onto areas of interest,» a DoD spokesperson explained, «or by covering areas that then allow the ScanEagle to fully exploit its more capable characteristics such as increased range or better endurance.» The spokesperson added that the Australian Defence Force «commenced an analogue to digital upgrade of the Skylark fleet in the 2007-08 financial year and will continue the process in 2008-09», and that «the Elbit announcement refers to this upgrade». However, an Elicit spokesperson confirmed to *Jane's* that new Skylarks had been purchased.

CANADA REVEALS $411 M BOOST FOR AFGHAN AIR OPERATIONS
By Damian Kemp
Jane's Defence Weekly, UK
www.jdw.janes.com
August 13, 2008

Canada is to spend up to CAD328 million (USD310 million) on helicopter lift and more than CAD100 million on unmanned aerial vehicles (UAVs) to support Afghanistan operations under plans announced by the Department of National Defence. Under the plan, up to CAD36 million will be spent on leasing commercial helicopters for use in Afghanistan and up to CAD292 million on buying ex-US Army Boeing CH-47D Chinook heavy-lift helicopters.
Minister of National Defence Peter MacKay announced the specifics at a press conference on 7 August but much of the detail on the helicopter elements, including the fact that the leased helicopters would be Russian-made Mi-8s, was

known earlier.
The CH-47Ds are in Afghanistan already but are not expected to be available for use by Canadian forces until February 2009. The complete figure for the deal is still being finalised by the US and Canadian governments but will include logistics support, training and project management costs and will not exceed CAD292 million.
The CH-47Ds are an interim measure while awaiting the delivery of 16 CH-47F+ Chinooks, which Canada is buying from Boeing at a cost of more than CAD4.7 billion, including a 20 year in-service support contract. That contract, however, has not yet been signed and is running two years behind the original schedule announced in mid-2006.
«For years, our Canadian forces have been in the unfortunate position of not having an option other than hitching rides with allies in order to move personnel in countries like Afghanistan,» said MacKay. «Those days are over.»
Also announced was a UAV boost for Canadian forces in Afganistan; a single Boeing ScanEagle UAV is being purchased for nine months in a deal worth up to CAD14 million, depending on flight hours, as well as a single Israel Aerospace Industries Heron UAV, a deal worth CAD95 million over two years from early 2009.
The UAV and helicopter deals are crucial for the Canadian government: an agreement to remain in Afghanistan, outlined in a parliamentary motion on 13 March 2008, is predicated on a boost to these two capabilities and was a key recommendation from the Independent Panel on Canada's Future Role in Afghanistan.

INDIA'S DPP 2008 TARGETS SPEED OF ACQUISITIONS
By Jon Grevatt
Jane's Defence Weekly, UK
www.jdw.janes.com
August 13, 2008

India's Ministry of Defence (MoD) has introduced updated defence procurement procedures (DPP 2008) that are focused on accelerating acquisition processes and providing greater flexibility to vendors meeting offset conditions. The DPP 2008 - an update of the 2006 version - is also designed to ease licensing conditions for private companies as well as increase transparency in platform and system field trials.
Formally introducing the policy on 1 August, Defence Minister A K Antony indicated that the priority of the DPP 2008 - which becomes operational on 1 September - was to address the speed of India's existing military acquisition procedures. He said: «Armed forces all over the world are in a process of speedy modernisation and restructuring. India cannot lag behind in this trend. We want a highly modern armed force, which will be able to respond quickly and which will be able to meet any challenges.»
Among the measures designed to accelerate acquisitions is the plan to grant the army, navy and air force powers to sanction capital spending up to INR500 million (USD I1 million). Additionally, the DPP 2008 outlines a two-year timeframe for issuing a request for proposals (RfP) once a particular platform has been selected. It also states that vendors will be informed in advance before an RfP is issued to provide them with adequate «lead time to prepare their responses».
India's offset scheme - which was introduced in the DPP 2006 - stipulated that defence contracts worth more than INR3 billion must include direct offset clauses amounting to a minimum of 30 per cent of the total value of the deal.
While these details have not changed, the MoD has introduced an offset banking condition, which enables «foreign vendors to create offset programmes in anticipation of future obligations» over a two-year time limit.
In addition, the DPP 2008 will make it easier for private Indian companies to participate in offset programmes. The updated procedures state that in order to benefit from offsets, the private company will be required to acquire an industrial licence only if so stipulated under the guidelines issued by the Department of Industrial Policy and Promotion.
It is a move that Antony believes will have a profound effect on India's ability to become self-reliant. He said: «This will hasten the process of indigenisation and help both the defence public sector units and private industry from entering into joint ventures with foreign companies.»
Also related to offsets is the DPP 2008's introduction of a 'fast-track procedure', which will waive off-sets for procurements deemed to necessary to meet «imminent operational requirements». In a bid to improve transparency, the DPP 2008 stipulates that field trial methodologies will now be incorporated into the RIP to «ensure that there is a common assumption by all agencies involved in the trial including participating vendors». India's updated defence procurement procedures are an improvement over previous policies, but fail to address the critical area of the transfer of advanced technologies to Indian defence companies, a defence analyst told *Jane's* on 4 August.
Deba Mohanty, a senior fellow in security studies at the New Delhi-based Observer Research Foundation, said measures aimed at improving transparency and accelerating the acquisition processes were a «definite improvement' 'over the previous policy. However, he added that when it comes to «critical issues related to defence production processes», the DPP 2008 «still has miles to go». Mohanty said he was particularly concerned that the updated procedures did not make any changes to the rules related to the transfer of technologies.

UK MUST ADDRESS ISTAR UAV ISSUES, SAYS REPORT

By Damian Kemp
Jane's Defence Weekly, UK
www.jdw.janes.com
August 13, 2008

The UK has successfully introduced a reconnaissance unmanned aerial vehicle (UAV) capability but needs to address personnel shortages and funding questions and update its Defence Industrial Strategy (DIS), according to a parliamentary report.

The House of Commons Defence Committee's report on 'The contribution of UAVs to intelligence, surveillance, target acquisition and reconnaissance [ISTAR] capability' was released on 5 August and, while acknowledging the importance of ISTAR and the UK's rapid introduction of the capability, notes that challenges remain.

In the space of three years the UK Royal Air Force (RAF), operator of the General Atomics Aeronautical Systems Reaper UAV, and the British Army, operating the Elbit Systems Hermes 450 (replacing the BAE Systems Phoenix) and the Lockheed Martin Desert Hawk, have gone from a limited to a substantial UAV ISTAR capability in the field.

However, the committee notes that urgent operational requirement (UOR) procurement has figured substantially for UAVs and it expects «the MoD [UK Ministry of Defence] to set out its future plans for the UAV systems acquired as UORs and where the future costs fall within the defence budget».

Additionally, the report calls on «the MoD to set out its longer-term strategy for acquiring UAV systems, given the concern expressed by industry that keeping the UAV systems acquired as UORs in service for a long time will [have an impact on] the UK's national capability in this area».

Speaking before the committee, UAV Systems Association (UK) Chairman David Barnes said: «The danger is [that], in pursuing UORs and keeping them in service for a long time, we will undermine our national capability to develop and deploy.»

Similarly, the committee called for the MoD to issue an update of the DIS, a move planned for December 2007 but postponed to coincide with Planning Round 2008 (PR08), which was concluded in mid-2008.

The DIS is planned to provide direction for industry in terms of what the MoD considers required core national capabilities and indications of procurement plans; it was released in December 2005.

«[It is] vital that the MoD ensures that the updated version of the DIS is published without further delay, so that industry is provided with the clarity it requires about future work and where it needs to invest,» the committee recommended.

«This is particularly important for those parts of industry working in high-technology areas, such as those relating to ISTAR and UAW»

According to information provided by the MoD to the committee, there is an 18 per cent shortage in RAF image analysts but there are «enough reserves to meet current requirements».

Additionally, there is a shortage of UAV operators in the army, with personnel reported at 48 per cent below the number required in January 2008, but this situation «has improved considerably», Air Vice-Marshal Stuart Butler, Capability Manager Information Superiority, told the committee.

US ARMY EYES ACCELERATED FCS PRODUCTION SCHEDULE

By Caitlin Harrington
Jane's Defence Weekly, UK
www.jdw.janes.com
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US Army officials continue to push for speedy production of Future Combat Systems (FCS), saying they are confident the system will save lives after observing its performance in a limited preliminary user test near Fort Bliss, Texas in late July.

Army officials tested the FCS 'Spin Out I' kit during a training exercise from 27 to 31 July, operating the network of weapon systems in a mock village between White Sands Missile range and Fort Bliss. «Our recommendation from everything we've learned so far is these [systems] are really going to help our soldiers down range,» in Afghanistan and Iraq, said Brigadier General James Terry, director of the army's Future Force Integration Directorate. «Our recommendation at this point, having gone through the preliminary limited user test, is that we need to move forward.»

FCS Spin Out I consists of a Non-Line-of-Sight Launch System (NLOS-LS) for precision fires; a 'B-kit' computer system to share imagery; unattended sensors; an aerial drone known as the Class I Block 0 Micro Air Vehicle (MAV); and a ground-based robot known as the Small Unmanned Ground Vehicle.

During the FCS test, army officials conducted mission scenarios that are common in Iraq and Afghanistan: cordoning and searching an area, and also setting up a command post. The exercise took place in an adobe village populated with service personnel posing as civilians. Army officials said their initial observations are that the infantry brigade combat team performed better in the exercise when it had the FCS equipment than when it did not.

Officials said the precision fires of the NLOS-LS and the situational awareness provided by the MAV were particularly helpful in conducting operations in a crowded urban environment. Based on those observations, Gen Terry said he advocated moving ahead with plans to conduct the next test - a preliminary user test - in 2009. That test will be followed

by a 'milestone C' decision to begin limited production of FCS Spin Out 1 in 2010. Gen Terry said the first army infantry brigade combat team will receive a complete FCS Spin Out 1 kit in 2011.
However, 'the army has already begun shipping FCS 'spin-out' parts to Iraq and Afghanistan, deploying the FCS MAV with both an army and navy unit. Gen Terry said he also expects to receive requests from combatant commanders for the early deployment of the NLOS-LS - a precise weapons system with a 40 km range - once it completes final testing. «It's about putting capability in the hands of soldiers in the platoon or company level that perhaps [they] had not seen before,» said Terry.

PRESS RELEASE

Unmanned Vehicles Go Head-to-Head on Salisbury Plain
BAE Systems, Salisbury, UK
August 15, 2008

Hunting down modern day security threats including a sniper, an armed vehicle, an improvised explosive device and a cell of armed terrorists are the focus of a new project involving BAE Systems, automotive design, development and certification consultancy MIRA and other partners from UK industry and academia.
Designed to replicate the real situational awareness problems faced by the armed forces today, the project forms a part of the 2008 UK MoD Grand Challenge, science and technology competition. BAE Systems is supporting an entry led by automotive design, development and certification agency MIRA, sharing its expertise in sense and avoidance technologies.
BAE Systems, MIRA, GFS Projects, ERA Technology which is part of the Avionics and Surveillance Division of Cobham plc, Warwick University and the Royal Grammar School Guildford are working in partnership to develop a three pronged approach to the Challenge, which will take place at the specialist Fighting in Built up Areas (FIBUA) range in Wiltshire. Using an autonomous ground vehicle, a remotely piloted unmanned air vehicle and a tethered miniature blimp the MIRA team will scan Copehill Down for four targets: a sniper, an armed vehicle, an improvised explosive device and a group of hostile soldiers.
«The challenge facing us is pretty realistic in terms of the difficulties soldiers are facing in the battlefield today. What we needed was a system that could look high and low and present as complete a picture of the environment as possible,» explains MIRA team leader Chris Mellors. «Combining the autonomous ground vehicle with the small UAV and the blimp has enabled us to do just that and we are very confident that the technologies we've used will meet the demands of the challenge».
Commenting on BAE Systems involvement in the team Professor Andy Wright, one of the company's experts in autonomous technologies, said: «We have a long standing relationship with MIRA, which has been instrumental in helping us develop and test autonomous technologies effectively. We are extremely pleased to be supporting their Grand Challenge entry and believe the team has devised an elegant solution capable of performing well at Copehill Down».

ATE SECURES VULTURE UAV EXPORT ORDER
By Helmoed-Römer Heitman
Jane's Defence Weekly, UK
www.jdw.janes.com
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South African aerospace company Advanced Technologies and Engineering (ATE) has won an export order for its Vulture tactical unmanned aerial vehicle (UAV) system, the company has said.
The order was confirmed at the end of May after a complete system was demonstrated in the undisclosed client's country with the support of the South African Army. The system is currently en route back to South Africa.
It is understood that a system ear-marked for the South African Army will be delivered to the export customer and later replaced by another system. ATE and the client are also understood to be discussing local manufacture of the Vulture system to meet future requirements.
The Vulture was developed for the South African Army's artillery as a target-acquisition and fire-direction system. It comprises a medium-sized UAV with a typical endurance of three hours at 60 km range, fitted with interchangeable day and night sensors. It is launched using a vacuum system and recovered using a net and soft pad. The entire system is normally transported on three 10-ton trucks. The UAV is controlled using a C-Band DSSS uplink and an encrypted narrow-band downlink specifically developed for it.
«ATE regards this first export contract of the Vulture UAV system as a significant milestone in earning foreign revenue that would enable the development of more advanced UAV systems for our local client: the South African Army artillery,» Lorris Duncker, ATE's director of external affairs, told *Jane's* on 7 July.
«International contracts furthermore strengthen the initiatives within South Africa to consolidate UAV expertise and resources, so as to serve the local client more efficiently and compete more effectively against international rivals.»

AUSTRALIA CARRIES OUT SIX-WEEK TRIAL OF HERON UAV

By Julian Kerr
Jane's Defence Weekly, UK
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Australia's Border Protection Command' (BPC) has held a six-week trial of the Heron 1 unmanned aerial vehicle (UAV) involving 80 hours of surveillance over Australia's northern coastline. The AUD5.5 million (USD5.2 million) trial was the first time that a large UAV has been placed on the Australian civil aircraft register and that a large UAV has flown under visual and instrument flight rules in non-controlled Australian airspace. Brendan Kosmerr, capability develop-ment technical manager of Australian Customs, said that most of the eight operational flights lasted less than 10 hours, although one of about 15 hours was close to the aircraft's maximum endurance while carrying the full sensor suite.

SECRET FLEET

Armed forces deploy various air platforms on crucial SIG INT missions around the world. Martin Streetly assesses their capabilities
Jane's Defence Weekly, UK
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August 16, 2008

Like many of today's military technologies, airborne signals intelligence (SIGINT) collection has undergone profound changes since Operation 'Desert Storm'. Prior to the 1990-91 Gulf War, airborne SIGINT was primarily a strategic activity, with a heavy emphasis on 'bean counting' air-defence radars (electronic intelligence, ELINT), monitoring military and political communications networks (communications intelligence, COMINT), establishing the technical parameters of strategic missiles (via the interception of associated telemetry traffic: telemetry intelligence, TELINT) and military emitters such as radars (technical intelligence, TECHINT).
Operation 'Desert Storm' marked the first attempt since the Vietnam War to employ SIGINT collected by air vehicles (AVs) in a tactical context, where acquired data could be used in real or near-real time to inform warfighters of threats and enemy intentions during operations.
Subsequent operations in the Balkans and particularly during the United States' 'global war on terror' have driven this process to the point where SIGINT platforms can now be used to detect, track, identify and monitor the fleeting, telephone-based/ short-range radio communications employed by insurgents and pass the derived intelligence to warfighters in executable engagement times. Equally, ELINT and COMINT capabilities have become a standard component in multi-sensor platforms of the types used for maritime, economic exclusion zone and homeland defence surveillance applications.
In terms of technology, the basic laws of physics have not changed and today's SIGINT hardware functions in much the same way as its forebears. What has changed is the ability to miniaturise; to integrate subsystems into open architectures that are much more easily upgraded (either as software fits or as hard-ware 'plug and play' dropins); to make use of commercially derived software and hardware in an environment that has traditionally been bespoke; to provide communications links (including machine-to-machine) that can provide real-time data hand-off for 'shooters'; and to process data in a way that is a quantum leap forward in terms of what information can be extracted from a particular intercept.
Such capabilities represent the high end of the genre and it is with these dedicated SIGINT platforms, rather than multi-sensor AVs, that this survey concerns itself. *Jane's* has identified 20 countries around the world that operate dedicated airborne SIGINT platforms.

Surveillance Platforms

The first thing to be said about Australia's 'Peace Mate' programme is that its existence has never been officially confirmed and no photographs of either the C-130 or P-3 aircraft supposedly involved have ever surfaced in the public domain.
That said, *Jane's* analysts believe the Royal Australian Air Force does operate single examples of 'Peace Mate'-configured C-130 and P-3 SIGINT aircraft, with the latter understood to have been outfitted by US contractor Raytheon (subsequently L-3 Communications Integrated Systems [L-3/IS]) during 1995-97. They are thought to be able to undertake COMINT collection within the 3 MHz to 3 GHz frequency range, being equipped with a satellite communications capability.
The 'Peace Mate' C-130 is reported as having been modified by Australian contractor Tenix, as making use of a predominantly US-sourced mission suite and (like its P-3 counterpart) as being equipped with a satellite communications capability.
A little more certain is Chile's continued use of at least one of three Hawker Beechcraft 99A utility transports that have been locally modified for ELINT work under the 'Petrel Beta' designation. The capability centres on the 30 MHz to 18 GHz band Desarrollo de Tecnologias y Sistemas (DTS) Itata ELINT system that incorporates analysis and direction-finding workstations. According to *Jane's* sources, Petrel Beta entered service in 1970, with three examples being reported as being operational during 2006.
Maintaining the enigmatic theme, China's airborne SIGINT capability appears to be vested in one or more variants of the Shaanxi Y-8 transport aircraft. As such, the capability appears to be part of the High and New (HN) programme,

with subprojects 'HN 2' and 'HN 4' being suggested as SIGINT platforms. Alongside these, a model of a Y-8 equipped with the CEIEC KZ800 ELINT suite was displayed in April at the Defence Services Asia (DSA) 2008 trade show.
Covering at least the 1-18 GHz frequency band, the KZ800 system is understood to comprise multi-operator equipment that is designed to detect, analyse (parameter measurement), identify and locate land-based and shipborne radars that are associated with air-defence networks and gun/artillery/missile fire control systems.
Of the two HN configurations, *Jane's* sources identify HN 2 as being the Y-8DZ that was first spotted during mid-2004 and is said to be in service with the People's Lib-eration Army (PLA) Navy's 1st Independent Air Regiment. HN 4 has been associated with both the Y-8T and YG-8 designations and is reported as being in service with the PLA Air Force. Of the two, HN 4 makes the most convincing SIGINT platform, particularly as it shares several external features and antenna arrays with the previously noted DSA 2008 display model.
Elsewhere within the Chinese military, the air force is known to have been operating at least one Tu-154 airliner that appears to have been modified for SIGINT. This aircraft was first identified during the mid-1990s.
Moving to the Middle East, the Egyptian Air Force (EAF) has acquired at least two (and possibly four) Hawker Beechcraft 19000-1 aircraft, together with two EC-130H transport aircraft for use as SIGINT collectors.
The 19000-1s (possibly designated as the 19000-1E variant) are understood to be equipped with a variant of the ESL/TRW (subsequently Northrop Grumman Mission Systems) ES5000 SIGINT suite that operates in four specific sub-bands (3-30 MHz, 30-300 MHz, 230-1,000 MHz and 300-3,000 MHz) within the 3-3,000 MHz frequency band. Other onboard equipment includes an air-to-ground datalink and, while not confirmed, the EAF's electric 19000-1s have been associated with its No 81 Squadron.
Egypt's EC-130Hs are thought to be COMINT platforms that were outfitted by the then E-Systems (subsequently L-3/IS) and delivered circa 1978. In July 2003 the US Defence Security Cooperation Agency flagged up a potential USD60 million sale of two roll-on/roll-off ELINT systems for installation aboard two «existing» Egyptian C-l30H aircraft. To date, the consummation of this deal remains uncertain.

Enigmatic Mission

Meanwhile, the French Air Force's Airborne Electronic Squadron 1/54 operates a pair of C-160G Gabriel SIGINT aircraft that were first fielded in 1989. Configured for both COMINT and ELINT, the Gabriel provides accommodation for nine systems operators and has a mission suite that was originally built around Thales-sourced COMINT receivers and analysis gear, together with the same company's 0.5-40 GHz Analyseur de Signaux Tactiques (ASTAC) ELINT system. While not confirmed, *Jane's* believes these aircraft have been progressively upgraded during their service lives.
The German Navy's Naval Air Wing 3 operates a pair of Br-1150 Peace Peek SIGINT aircraft. Again equipped for the role by the ubiquitous E-Systems, the Peace Peek aircraft have been the subject of at least one major mission-suite upgrade and are scheduled to be replaced by the Euro Hawk unmanned aerial vehicle (UAV).
Based on the RQ-4 Block 20 airframe, the Euro Hawk SIGINT platform will be equipped with an EADS-developed COMINT/ELINT payload that covers the 30 kHz to approximately 30 GHz frequency band. As currently scheduled, the first Euro Hawk platform will be delivered in 2010 and, if successful, will be followed by four additional AVs during 2011-14.
The Israel Air Force's No 122 Squadron employs three Gulfstream V Shavit (Comet) SIGINT aircraft that are equipped with the Elta EL/I-3001 airborne integrated SIGINT system. The baseline EL/I-3001 offers both COMINT (20-1,200 MHz band) and ELINT (0.5-18 GHz band) capabilities. Operated by a 12-strong mission crew, the Shavit architecture incorporates both satellite communications and a datalink and is believed to have been used operationally for the first time in August 2006.
Israeli industry is also the source of the EL/K-7071 COMINT and EL/L-8385 ELINT payloads and the EL/L-8300 SIGINT suite that are believed to have been installed aboard the Indian Navy's four Israel Aerospace Industries Heron UAVs and Israeli C-I30H SIGINT platforms respectively.
The Heron UAV s are assigned to India's Navy Air Squadron 342 and, while photographic evidence shows installation of the antenna arrays associated with the cited SIGINT payloads aboard such AVs, the payloads themselves may not be fitted. Use of an EL/L-8300 configuration aboard Israel's supposed pair of SIGINT C-130Hs is suggested by a 2001 Elta brief that noted installation of four such systems aboard Hercules transport aircraft.
Elsewhere within the Indian intelligence community, the Aviation Research Centre (ARC) includes a Boeing 707-337C SIGINT platform in its inventory of fixed- and rotary-wing aircraft. Characterised by 'cheek' antenna fairings, the ARC's B-707, which has been based at Indira Gandhi/Palam International Airport near Delhi, has been variously reported as being equipped with either a US or an Israeli mission suite. *Jane's* analysis leans towards the former because E-Systems documentation and the CIA's involvement in the establishment of the ARC during the 1960s supports this view.
India's known airborne SIGINT capability is rounded out by the 'information warfare' Do 228-201 aircraft operated by Naval Air Squadron 310. Such aircraft are equipped with a multiport antenna array at each wingtip and have been variously reported as being equipped with the 0.5-18 GHz Elisra AES-210/E Emerald electronic support (ES)/ ELINT system or Bharat's up to 18 GHz Airborne ES System (AESS).
The Italian Air Force's 14th Wing includes a single G222VS SIGINT aircraft within its inventory. The G222VS is

understood to be equipped with both Italian and US-sourced mission equipment and as providing accommodation for 10 system operators. Entering service in 1981, the G222VS is deemed to be in need of replacement, with a roll-on/roll-off capability installed aboard a C-130 being a mooted alternative. However, no replacement has been funded to date.

Naval Patrol

Turning to East Asia, both Japan and South Korea operate SIGINT aircraft, with the former's capability being primarily vested in the Japan Maritime Self-Defence Force's (JMSDF's) EP-3 platform. Based on a Kawasaki-built P-3C maritime patrol aircraft airframe, the EP-3 was first flown in October 1990. It is equipped with a mission suite that covers the 30 MHz to 20 GHz frequency band and has been jointly developed by Japanese contractors NEC ('low'-band segment) and Mitsubishi ('high'-band segment). The designations NH/LR-107 and NH/LR-108 have been authoritatively associated with the two subsystems, although the specific nomenclature to band coverage relationship remains unclear. Elsewhere, the type is reported as being flown and operated by a crew of 23 and as having both TELINT and SIGINT capabilities. The JMSDF has acquired five EP-3 aircraft that are assigned to its 81st Squadron.
The Republic of Korea Air Force (RoKAF) operates a quartet of Hawker 800SIG SIGINT-configured business aircraft (also known as the RC-800 or the 'Paekdu/Peace Pioneer' platform) as part of the surveillance capability that is used to monitor the activities of its northern neighbour on the Korean peninsula. Like many other platforms, the Hawker 800SIG is fitted with a COMINT/ELINT system that was developed by E-Systems and which is quoted as having an upper frequency limit of 40 GHz. While not confirmed, the RC-800s may be assigned to the RoKAF's 39th Tactical Reconnaissance Wing.
Elsewhere in the region, both Singapore and Taiwan are understood to operate single examples of SIGINT configured C-130s. The Singaporean platform is thought to have been outfitted by Israeli industry and is said to cover the 3 MHz to 3 GHz COMINT band. Taiwan's C-130HE has been developed by a consortium of Lockheed Martin and the country's Chung Shan Institute of Science and Technology and is reported as having been assigned to the Taiwanese Air Force's No 6 Squadron. The Royal Thai Air Force's No 402 Squadron operates three Arava 201 transports that have been outfitted with an Israeli SIGINT system.
Returning to a European orbit, Poland, Spain, Sweden and the UK have all fielded airborne SIGINT platforms. The Polish Air Force operates at least one (possibly three) W-3RR Procjon-3 SIGINT helicopters equipped with a Polish-developed mission suite that incorporates two operator consoles and covers the 20-18,000 MHz frequency band.
Within the Spanish Air Force, the 47th Mixed Group operates a single Boeing 707-351C SCAPA aircraft that is configured for both electro-optical (EO) imaging and SIGINT collection. As originally developed, the SCAPA platform made use of hardware from the Elta EL/L-8300 COMINT/ELINT suite married to core software created by local manufacturer Indra.
The Swedish Air Force's 17M Wing includes a pair of S 102B Korpen (Raven) SIGINT aircraft that are based on the airframe of the Gulfstream IV business jet. Operated by a systems crew of four, the Korpen capability is based around a variant of TRW's Wideband Tactical Surveillance System (WTSS), which provides 20 MHz to 2 GHz band COMINT and up to 40 GHz ELINT coverage. Like many other applications of its kind, WTSS incorporates an air-to-ground datalink.

Intelligence Collection

The UK Royal Air Force's (RAF's) No 51 Squadron is equipped with a trio of Nimrod R Mk 1 SIGINT aircraft that are capable of COMINT and ELINT functionality. Since coming into service in 1973, the Nimrod R Mk 1 has been the subject of two major upgrades and has been slated for a third.
In the first instance, the 1992 Starwindow effort is understood to have been aimed at the platform's COMINT subsystem and incorporated a network of 22 new digital receivers. The 1998 Project Extract addressed the modernisation of the aircraft's ELINT capabilities and was rebaselined during 2002 to incorporate new antennas and front-ends; some automatic functionality; a central database; and data fusion provision. Extract was completed during September 2003 and was to have been followed by Project Helix, which would have given the Nimrod an open architecture. However, Helix appears to have withered on the vine as the RAF mulls whether to replace the aged Nimrod with a new platform. Possibilities include the lease of a number of US RC- 135V/W 'Rivet Joint' (RJ) platforms.
The US itself fields a considerable airborne SIGINT capability, with dedicated platforms being operated by the US Air Force (USAF), US Navy (USN), US Army, the Air National Guard (ANG) and the Customs and Border Protection (CBP) agency.
The USAF capability is vested in two RC-135U 'Combat Sent' TECHINT, 17 RC-135V/W RJ COMINT/ELINT, three RC-135S Cobra BALL TELINT and 28 or so U-2S aircraft. Of these, the latest detailed RJ configuration is the Block 8, which is designed to provide an enhanced SIGINT collection capability, automated information dissemination, improved system reliability and enhanced user friendliness.
The Block 8 configuration can be recognised by its revised ventral antenna array and is expected to be joined by a Block 9 update in 2008-09.
The RC- 125U/V/W/S aircraft are operated by the USAF's 55th Wing. The RJ architecture also appears to form the basis of Saudi Arabia's pair of RE-3A/B SIGINT aircraft.
The ultra high-altitude U-2S' SIGINT capability takes the form of the Senior Glass COMINT/ELINT collection subsystem, a fully digitised variant of which was fielded during 2001. The U-2S has also acted as the testbed for

Northrop Grumman's next-generation Airborne Signals Intelligence Payload (ASIP), five examples of which are expected to be used operationally by the U-2 fleet.
Looking to the future, the U-2S is scheduled to be replaced by the RQ-4 Global Hawk UAV starting in 2012. The RQ-4 Block 40 will carry an ASIP payload and Northrop Grumman is known to be undertaking work on ASIP applications for the US RC-12S 'Guardrail' SIGINT platform and the USAF's MQ-1 (ASIP-1C) and MQ-9 (ASIP-2C) UAVs. The U-2S is operated by the USAF's 9th Reconnaissance Wing.
The USN currently operates a fleet of 16 EP-3E COMINT/ELINT collection aircraft, the latest known update of which is designated as the Joint SIGINT Avionics Family (JSAF) Modernisation (JMOD) configuration. Launched in 2005, the JMOD was originally intended to be developed incrementally, with Spiral 1 introducing enhanced frequency coverage and Link 16 connectivity (amongst other things), Spiral 2 adding a data fusion/decision-making capability and Spiral 3 introducing a better low-band signal col-lection/direction-finding capability, remote tuning receivers and new antenna arrays (amongst others).
As currently planned, the EP-3E is set to be replaced by a new EP-X aircraft that was originally baselined to offer the same SIGINT capability as JMOD Spiral 3. Although billed as an EP-3E replacement, EP-X will be a multi-sensor platform that will incorporate SIGINT, radar and EO sensors. Aircraft in the service's current EP-3E fleet are assigned to USN squadrons VQ-1 and VQ-2.

Signals Analysis

Within the US, the service is recapitalising 33 of its RC-12K/N/P/Q 'Guardrail' COMINT/ ELINT aircraft to a common RC-12S standard that will introduce the Communication High Accuracy Location Subsystem-Compact (CHALS-C) geolocation system; an enhanced situational awareness (ESA) capability derived from the ASIP architecture; a new high-band COMINT capability; enhanced 'special signals' provision; and the X-MIDAS signals-processing package. Scheduled to enter service circa 2010, the RC-12S' COMINT subsystem also forms the basis of the COMINT system planned for the service's Aerial Common Sensor Increment 1 platform.
Within the ANG, the Utah-based 169th Intelligence Squadron is equipped with three roll-on/roll-off 'Senior Scout' COMINT/ ELINT shelters that can be carried by 'quick-change' C-130 Super E, H, H1 and H2 transport aircraft. When carrying 'Senior Scout', such aircraft are fitted with clip-on antenna arrays (located on their main under-carriage and parachute doors, wingtips and tailcones) and as originally fielded 'Sen-ior Scout' provided 2 kHz to 300 MHz band COMINT and 2-18 GHz band ELINT coverage. Elsewhere, the CBP is known to have operated a COMINT-configured P-3A aircraft registered as 'N16370', which is known to have been used in a counter-narcotics role.

PRESS RELEASE

NGC Names George Guerra to Lead Global Hawk Unmanned Aircraft Program
Northrop Grumman Corporation, San Diego, USA
August 18, 2008

Northrop Grumman Corporation (NYSE:NOC) has appointed George Guerra vice president of High-Altitude Long-Endurance (HALE) Systems. Guerra assumes responsibility for overall program performance and growth of the family of RQ-4 Global Hawk unmanned aircraft systems.
«As one of the pioneers of the Global Hawk program, Guerra brings a wealth of expertise and leadership to HALE Systems, and this promotion is a testament to his years of contributions and commitment to the company,» said Duke Dufresne, sector vice president for Northrop Grumman's Integrated Systems Western Region. «His keen ability to set high expectations, inspire his teams, deliver results and maintain strong customer relationships will help him build upon the successes of the program.»
Guerra joined Northrop Grumman in 1994 after working 11 years at General Dynamics-Convair on their cruise missile programs. He was instrumental during early proposal efforts for the Global Hawk program, working initially as integrated product team (IPT) lead responsible for the development, fabrication and testing of the Global Hawk composite wing assembly. He then served as airframe IPT design and manufacturing lead, helping to complete and deliver several Global Hawks, including the first air vehicle in 1997. He has also served in various positions of increasing responsibilities as project engineer, deputy program manager, U.S. Air Force program manager, and director and deputy of the Unmanned Systems market segment for the company. Guerra earned a bachelor's degree in chemical engineering from Yale University and master's degrees in manufacturing engineering and business administration from Boston University.

GAO REJECTS BAMS CONTRACT PROTEST
By Gareth Jennings
Jane's Defence Weekly, UK
www.jdw..janes.com
August 20, 2008

The US Navy (USN) is to proceed with its Broad Area Maritime Surveillance Unmanned Aircraft System (BAMS UAS) programme following a decision by the US Government Accountability Office (GAO) to deny a contract award protest, it was

announced on 11 August.
0n 8 August, the GAO rejected Lockheed Martin's bid to overturn the awarding of a USD1.16 billion system development and demonstration (SDD) contract to Northrop Grumman for its RQ-4N Global Hawk high-altitude long-endurance (HALE) unmanned aerial vehicle (UAV). Lockheed Martin protested the USN's decision to choose the RQ-4N to fulfil its BAMS requirement on the basis that it believed its Mariner UAV (developed in partnership with General Atomics Aeronautical Systems) «offered a technically compliant and awardable solution at significantly lower cost [than the Northrop Grumman bid]». It requested a GAO overview of the decision-making process.
According to Northrop Grumman's director of business development of HALE systems, Thomas Twomey, the company was instructed by the USN to cease its work on the BAMS programme until the protest was resolved. The programme manager of the US Naval Air Systems Command's Persistent Maritime Unmanned Aircraft Systems Program (PMA-262), Captain Bob Dishman, said that the navy is now «in the process of addressing programme impacts as a result of the protest to ensure the BAMS UAS is delivered as expeditiously as possible to the fleet».
Northrop Grumman was awarded the SOD contract for the BAMS system on 22 April, beating both Lockheed Martin's Mariner UAV and Boeing's Gulfstream G550 business jet solution. Potentially, BAMS could be worth in excess of USD3 billion. As part of the USN's BAMS requirement, the Global Hawk will integrate with the Boeing P-8A Poseidon maritime multi-mission aircraft and the EPX airborne intelligence, surveillance and reconnaissance (ISR) and targeting aircraft programme to provide the navy with a persistent maritime and littoral ISR capability.

ISRAELIS HELPED GEORGIA WITH TRAINING, ARMS
By Alon Ben-David
Jane's Defence Weekly, UK
www.jdw..janes.com
August 20, 2008

Israeli companies have been discreetly involved in training and equipping the Georgian forces for nearly two years, it emerged during the recent conflict.
Amid firming relations between the two nations, the ties extend to the Georgian leadership, with President Mikhail Saakashvili appointing Israel-educated David Kezerashvili as his defence minister in 2006.
In the wake of the April downing of a Georgian Hermes 450 unmanned aerial vehicle (UAV) by a Russian MiG-29 fighter over Abkhazia, however, the Israeli MoD feared that a massive supply of weapons to Georgia could harm Israel's relations with Russia and limited the sale of equipment to defensive systems only.
The limitations did not extend to training and instructing the Georgian armed forces, which two Israeli companies have undertaken for the past two years. Defensive Shield and Global CST - both led by former high-ranking members of the Israel Defence Force (IDF) - sent personnel including IDF reservists and veterans. The contractors have been out of the country since late July, although they maintained close contact with Georgian counterparts during the conflict.
«The Georgians were trying to build an army from scratch and prepare it for a conflict with Russia,» an industry source told *Jane's.* «We helped them organise their infantry units, trained their special forces and taught them how to gather and utilise intelligence. However, they did not ask for - and we didn't provide them with - any strategic assessment.»
Despite pressure from Israeli companies eyeing Georgia's defence budget, only a handful of export deals have been approved, among them Elbit Systems' 2007 sale of five Hermes 450 long-endurance UAVs and several dozen Skylark mini-UAVs. Israel Military Industries also sold several Lynx wheeled multiple rocket launch systems to Georgia through a third party. A Georgian request to acquire Israeli Merkava main battle tanks was rejected.
Asked how Israeli-Georgian deals could affect relations with Russia, Israeli Defence Minister Ehud Barak told *Jane's:* «Russia is very important to us but, remembering our history, we should not abandon our friends in their time of need.»

TESTS VALIDATE WATCHKEEPER SYSTEM
By Denise Hammick
Jane's Defence Weekly, UK
www.jdw..janes.com
August 20, 2008

The Watchkeeper unmanned aerial vehicle (UAV) - which will provide an intelligence, surveillance, target acquisition and reconnaissance (ISTAR) capability for UK forces - validated its automatic take-off and landing system, known as MAGIC ATOLS, an 12 August. Integrated onto the Elbit Hermes 450 UAV, the system has a standalone archi-tecture and provides redundancy during take-off and landing because it eliminates the need to use GPS. The flights took place on 23 July at Megido airfield in Israel.
The Watchkeeper, being developed by Thales UK with Elbit Systems, will be produced at UAV Tactical Systems Ltd in v Leicester and will involve a dual-payload configuration of advanced synthetic-aperture radar, ground moving-target indicator, electro-opticaVinfrared/laser target designator sensors, ground control stations with networked distribution and a flexible, all-weather operation with a de-icing capability. It is planned to enter service in 2010.

US DOD WINS FUNDING FOR ISR ASSETS

By Caitlin Harrington
Jane's Defence Weekly, UK
www.jdw..janes.com
August 20, 2008

The US Department of Defense (DoD) has successfully petitioned the US Congress to move USD1.2 billion into a separate fund for additional intelligence, surveillance and reconnaissance (ISR) assets in Afghanistan and Iraq.
Congressional defence committees have approved the Pentagon's Fiscal Year2008 (FY08) reprogramming request, which will pay for2l manned surveillance aircraft, the purchase of additional Boeing/Insitu ScanEagle unmanned aerial vehicles (UAVs), and improvements for UAVs already in theatre. Drones scheduled to receive improvements include the AN Corporation RQ-7 Shadow, General Atomics Aeronautical Systems MO-1 Predator and MQ-9 Reaper and the Northrop Grumman/Israel Aerospace Industries RQ-5 Hunter, according to Pentagon spokesman Bryan Whitman.
The Pentagon requested the additional funds for ISR assets on the recommendation of a new taskforce established by Secretary of Defense Robert Gates in April. The taskforce was charged with finding ways to speed the deployment of ISR assets to combat zones. Gates created the taskforce after complaining that the services were dragging their feet on the delivery of much-needed ISR assets to Iraq and Afghanistan. «Because people were stuck in old ways of doing business, it's like pulling teeth,» Gates said in a speech at the Air War College at Maxwell Air Force Base in Alabama. The criticism was widely interpreted to be aimed at the US Air Force, which has historically tended to focus on the acquisition and deployment of manned aircraft rather than surveillance drones.

PRESS RELEASE

AeroVironment Receives $4.6 Million in DARPA Funding to Develop Stealthy, Persistent, Perch and Stare UAS Based on Wasp

AeroVironment, Inc.
Monrovia, California, USA
August 20, 2008

AeroVironment, Inc.(AV) announces the receipt of $4.6 million in funding from the Defense Advanced Research Projects Agency (DARPA) to develop a small Unmanned Aircraft System (UAS) capable of performing «hover/perch and stare» missions. The Stealthy, Persistent, Perch and Stare (SP2S) UAS is based on AV's small Wasp UAS, a one-pound, 29-inch wingspan battery-powered air vehicle that is being procured and deployed by both the U.S. Air Force and the U.S. Marine Corps.
The goal of the Stealthy, Persistent, Perch and Stare program is to develop the technology to enable an entirely new generation of perch-and-stare micro air vehicles capable of flying to difficult targets, landing on and securing to a «perch» position, conducting sustained, perch-and-stare surveillance missions, and then re-launching from its perch and returning to its home base.
«A UAS that performs hover/perch and stare missions is viewed as an important capability for our armed forces,» said John Grabowsky, AV executive vice president and general manager of Unmanned Aircraft Systems. «Our production Wasp incorporates the latest technologies to provide a day and night capable, hand-launched UAS that fits into a standard backpack while still providing room for other important supplies. We believe that the Wasp-based SP2S, operated with our joint, common ground control unit, is on track to develop into a portable, practical and affordable perch-and-stare micro air vehicle,» he added.
U.S. armed forces including the Army, Marine Corps, Air Force and USSOCOM, as well as international forces such as those of Italy, Denmark, Spain and the Netherlands, use AV's hand-launched UAS and handheld ground control unit for missions that include base security, route reconnaissance, mission planning, battle damage assessment and force protection. Raven, Wasp and Puma AE each have won full and open competitions sponsored by agencies of the U.S. Department of Defense, becoming the sole small UAS for their respective programs of record. AV has delivered more than 10,000 new, replacement and refurbished small unmanned aircraft to date.

For Additional Information Contact:

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Facilitating Access To Global UVS Information

The electronic **UVS News Flash** is produced by Blyenburgh & Co for UVS International and is supplied **free-of-charge** by email. The UVS News Flash has as purpose to help raise the level of global awareness relative to ongoing research & development, relevant technologies, production and sales, as well as current & future applicatons of unmanned vehicle systems (UVS) (air, ground & naval), by making existing published information available to a wider readership.

SOURCE MATERIAL

The following **UVS International media partners**:

- Aerospace & Defence Network, The Netherlands
- Armada International, Switzerland
- Avionics Magazine, USA
- Canadian Defence Review, Canada
- Defence News, USA
- Frontline, Canada
- Jane's Defence Weekly, UK
- Jane's Navy International, UK
- Strategie & Technik, Germany
- TTU, France
- Asia Pacific Defence Reporter, Australia
- Armed Forces Journal, USA
- C4ISR Journal, USA
- Defence Management Journal, UK
- Fantassins, France
- Flight Tech Online, USA
- Jane's International Defence Review, UK
- Military Technology, Germany
- Training & Simulation Journal, USA

have authorised UVS International to include the relevant articles that they publish in the weekly UVS News Flash. The aforementioned media partners are sincerely thanked for their cooperation.
In addition, the UVS News Flash contains press releases submitted by industry (UVS International members, as well as non-members) and regulatory and government authorities (military & civil). Multiple articles are also searched for on the web. In all cases the source of the information, the name of the author (if applicable) and the date of publication, as well as the publication's web site, are indicated.
For security reasons, many of the recipients of the UVS News Flash cannot access web sites from their office computers. Therefore, the UVS News Flash does not rely on supplying links to various web sites where information can be found, but proposes the entire text of the relevant articles & press releases.

LANGUAGE All articles in the UVS News Flash are in English.

CIRCULATION

The UVS News Flash is distributed every two weeks by email to a qualified readership of more than **6 000 persons** in **68 countries** directly involved with unmanned vehicle systems. Many of these recipients forward the News Flash on to others within their organizations, which substantially increases the News Flash circulation. All UVS News Flashes are posted on **www.uvs-info.com**

GETTING ON THE RECIPIENTS LIST

Registration on **www.uvs-international.org** or **www.uvs-info.com** by qualifying entities automatically assures being inserted on the email listing used to send out the publication.

QUALIFIED READERSHIP

The qualifed recipients of the UVS News Flash consist of: UVS International members, government, military, diplomatic and internatioonal organization representatives, regulatory authorities, researchers, academia, as well as partner organizations and associations.

SUBMISSION OF PRESS RELEASES & ARTICLES

All recipients of the UVS News Flash are encouraged to supply UVS International by email with their press releases & announcements. All recipients are also encouraged to forward the UVS News Flash to their contacts & relations. Publications (printed & electronic press) interested to have their relevant articles included in the UVS News Flash are requested to contact UVS International (**info@uvs-international.org**).

ADVERTISING RATES

The advertising rates have been kept extremely reasonable in order to make advertising in this medium also possible for small and medium sized companies. The UVS News Flash is without doubt the most cost effective way possible for an advertiser to regularly get his message out to the targeted international unmanned vehicle systems community.

2008 UVS NEWS FLASH ADVERTISING RATES

Positions: 2nd & following pages *only (cover page is not available for advertising)*		Rates in Euro excl. VAT	Cost per insert in Euro excl. VAT	Applied Discount
Full page advertisement in	- 4 consecutive issues	**1 000**	250	
	- 8 consecutive issues	**1 800**	225	-10%
	- 12 consecutive issues	**2 544**	212	-15%
	- 24 consecutive issues	**4 800**	200	-20%
	- 48 consecutive issues	**8 976**	187	-25%
Half page advertisement in	- 4 consecutive issues	**548**	137	
	- 8 consecutive issues	**984**	123	-10%
	- 12 consecutive issues	**1 404**	117	-15%
	- 24 consecutive issues	**2 640**	110	-20%
	- 48 consecutive issues	**4 944**	103	-25%

Note: Orders for less than 4 consecutive insertions will not be accepted.
19,6% VAT will be due by companies established in France.
Euro 1 = US$ 1,50 (for indicational purposes only; the exchange rate may vary from day-to-day)

Agency Commissions Indicated advertising rates do not include any commissions for agencies. If an agency commission is required, such commission should be added to the indicated prices.

Invoice Currency All invoices will be issued & must be paid in **Euro**.

Advertisement Booking In order to be valid, advertisement bookings must be made by completing and signing the News Flash Advertisement Booking Form. The completed form is to be transmitted by post or fax to Blyenburgh & Co. Bookings will be legally binding after written booking confirmation by means of an official invoice sent by the Publisher.

Payment Deadline A booked advertisement will only be published after receipt of payment.

Publication Dates The UVS International News Flash is published & emailed out Saturday or Sunday every two weeks.

Copy deadline The advertisement copy is to be received by Blyenburgh & Co on the Tuesday preceeding the Saturday on which the News Flash in which the advertisement is to be placed will be published.

ADVERTISEMENT COPY INSTRUCTIONS

- The advertisements can be submitted in JPEG, Photoshop, Illustrator or PDF format. Please note that we operate in a PC environment.
- The advertisements should have the following sizes:
  - Full page advertisements : 238 x 164 mm (height x width);
  - Half page advertisements : 119 x 164 mm (height & width).
- The advertisement file should should have the lowest possible resolution acceptable for screen reading & printing; 72 dpi is suggested.
- Advertising copy files are to be sent to Blyenburgh & Co by email at rc@uvs-info.com & pvb@uvs-info.com.
- The advertising copy for each insertion may be different.
- For further questions relating to the supply of your advertising artwork, please contact Blyenburgh & Co.

ADVERTISING CONTACT

Russ Curry
Tel.: 33-1-47.43.01.98 - Cell: 33-6-07.16.72.02 - rc@uav-info.com

2008 ADVERTISEMENT BOOKING FORM

Advertiser's Order Number: .....

COMPANY INFORMATION

Company .....
Company Contact **Ms/Mr** .....
Company Address .....
City ..... **State/Province** .....
Postal/Zip Code ..... **Country** .....
Tel ..... **Fax** .....
Email .....
VAT Identification Nr ..... (**Obligatory for companies in EU countries**)

ADVERTISING AGENCY INFORMATION (if applicable)

Agency .....
Agency Contact **Ms/Mr** .....
Agency Address .....
City ..... **State/Province** .....
Postal/Zip Code ..... **Country** .....
Tel ..... **Fax** .....
Email .....
VAT Identification Nr ..... (**Obligatory for companies in EU countries**)

ORDERS ☐ **Advertisement**

Advert Location **For half page advertisements** ☐ **Top side of page** ☐ **Bottom side of page**

Advert Size ☐ **Full page, full colour** ☐ **Half page, full colour**

Frequency
☐ **4 consecutive issues**
☐ **8 consecutive issues**
☐ **12 consecutive issues**
☐ **24 consecutive issues**
☐ **48 consecutive issues**

Advert Rate **Euro** .....

Order confirmation is to be sent to ☐ **Company** ☐ **Agency**

Payment Method ☐ **Bank transfer** ☐ **Credit Card (VISA, CB, Eurocard, Mastercard, AMEX)**

Invoicing ☐ **Invoice Company** ☐ **Invoice Agency** **For attention of:** .....

News Flash copy ☐ **Send to Company** ☐ **Send to Agency** **For attention of:** .....

I have read, understood and accept the Publisher's Terms & Conditions. By signing this document, I confirm that I am an authorized signatory for my company.

Signature: .....

Date: .....

NOTE: *On receipt by email, fax or letter of this form, duly completed and signed, an official invoice will be sent by email & airmail.*

FAX COMPLETED FORM TO: 33-1-46.51.05.22

4th Year - Issue 2008/15 UVS NEWS FLASH August 25, 2008

ADVERTISING IN THE 2008 UVS NEWS FLASH - TERMS & CONDITIONS

In these Terms & Conditions «the Publisher» means Blyenburgh & Co; «the Advertiser» means the advertiser or its agent, whichever is the principal; and «Advertisement» means the advertising space booked by the Advertiser.

01 The receipt of the signed advertisement booking form by the Publisher constitutes a binding contract.

02 Unless otherwise stated, fees payable to the Publisher for Advertisements are stated exclusive of VAT (which shall be payable in addition). VAT will only be charged to Advertisers established in France.

03 Unless otherwise expressly agreed in writing, all invoices will be issued in Euro and will be payable in accordance with the payment instructions indicated on the invoice.

04 All cheques must be in Euro and be made payable in France to the Publisher and sent to the Publisher at the address appearing on the invoice.

05 The Advertiser shall submit to the Publisher suitable Advertisement copy by the due date notified by the Publisher. If such copy has not been received by such date, the Publishers may refuse the Advertisement and may reproduce material already held from the Advertiser, or may print the name and address of the Advertiser in place of the Advertisement, and the Publisher shall not be responsible for any mistake, error, or omission in such copy.

06 The Advertiser shall supply to the Publisher all necessary artwork to reproduce the Advertisement. Supplementary processing costs incurred by the Publisher will be charged to the Advertiser where artwork is not supplied in the specified form. The Publisher may stipulate special charges and conditions for special Advertiser requirements.

07 Cancellations can be accepted only if received in writing not later than 7 days prior to the publication date. Cancellations received after this date are subject to a 50% adjustment fee.

08 Special positions are given only if agreed to in writing by the Publisher. An additional charge may be levied.

09 All production work handled by the Publisher, including reproduction from complete artwork, will be charged at cost to the Advertiser.

10 The Publisher reserves the right to refuse or cancel any Advertisement without any reason or notice, (returning any money paid).

11 Advertising copy that may be mistaken for non-advertising material (Advertorials) must be clearly marked «Advertisement».

12 The Publisher reserves the right to alter or postpone the publication date.

13 The Publisher cannot take any responsibility for the accuracy of copy given verbally to the Publisher. Publisher is not responsible for any misspellings or other errors in advertisements.

14 Advertisers' material or the material supplied by their agents is held by the Publisher at the owner's risk. The Publisher will retain such material for up to 12 months and reserves the right to destroy them thereafter if their return is not requested in writing by the Advertiser within six (6) months of the date of the publication of the Advertisement.

15 The Advertiser indemnifies the Publisher in respect of any loss, expense, cost or damage incurred or suffered by the Publisher as a result of any claim made against the Publisher arising from the Advertisement. The Publisher will consult with the Advertiser as to the way in which any such complaints are to be handled.

16 The Publisher is not responsible for any loss howsoever occasioned, as a result of delay or failure to publish this publication.

17 The Advertiser hereby warrants to the Publisher that its Advertisements are in no way whatsoever a violation of any existing copyright and that they contain nothing illegal, defamatory, objectionable, indecent or libellous, and hereby indemnifies the Publisher against any loss, injury or damage which may be occasioned to the Publisher in consequence of any breach of this warranty arising from the placing of its Advertisement in the Publisher's publication.

18 The Advertiser must notify the Publisher in writing of any complaints it has or receives regarding the Advertisement within twenty eight (28) days of the relevant publication date.

19 Each invoice rendered by the Publisher to the Advertiser or its agency shall be paid within 30 days of the date of the invoice. Should any invoice remain unpaid after the expiry of 30 days, then the Publisher reserves the right to charge interest on the outstanding invoice at the rate of 1,5% per month or part of the month from the date when the invoice shall have been due for payment, until payment is actually received by the Publisher.

20 Notwithstanding aforementioned §19, if notification of receipt of payment of an advertisement booked has not been received by the Publisher from his bank 3 days prior to the publication date, the relevant advertisement will not be published.

21 The Advertiser will receive an electronic copy by email of the publication in which the advertisement appears on the publication date of the publication.

22 Should the Advertiser or its agency fail to supply Advertisement material of an acceptable standard or instructions by the specified copy deadline, then the Publisher reserves the right to charge the full cost of the Advertisement booked.

23 The Publisher may charge to the Advertisers' or its agency's account the cost of enforcing any of its rights against the customer for non-payment of outstanding debts in accordance with the Publisher's terms, including any expenses incurred by reason of the customer's breach of these conditions. Should the Publisher refer an outstanding account to either a debt collection agency or solicitors for collection, then any possible future business to be transacted with that customer will be entirely at the discretion of the Publisher.

24 These terms and conditions contain all the terms of the order and no other terms will be incorporated into the order. The order is in respect of the Advertisement only, and is not dependent on any other terms.

25 Orders are bound by the Laws of France and subject to the jurisdiction of the French courts.

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Bankers: Banque Espirito Santo et de la Vénétie - Bank Identifier Code (BIC): BESV FRPP
International Bank Account Number (IBAN): FR76.4365.9100.0000.0182.8400.176